Finding Fish – The Smart Way

The Pike

What use is the best fishing technique if you are looking in the wrong spot?

A guide by the-fishfinders.com

Impressum

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Introduction

Finding Fish – The Smart Way

In the first book of our series „Finding Fish – The Smart Way," we introduced the zander. The pike is the protagonist of our second book. This freshwater fish holds a special place in the hearts of many anglers, largely due to its predatory nature, incredible size, and power. It's a selfie favorite.

The pike inhabits the northern hemisphere. Many have written about its nature and best fishing techniques—endless recommendations are available concerning baits alone. Hardly any other fish has received more attention. For all these reasons, the pike is a favorite amongst anglers.

„Finding Fish – The Smart Way" aims to complement the existing conversation with scientific research. While others might merely state „the pike likes to remain in cool waters," we wish to know why and when. And yes, pike like to hunt roaches. But what is their hunting strategy? And does this general wisdom apply at all times? These are just some of the questions we hope to answer.

Research on the pike has a long history and dates back over a hundred years. No other fish has been the subject of more studies. We have a lot to go through. Some of our previous ideas will be reaffirmed. Others might be challenged. A lot will be learned.

In response to our first book, many readers reached out to ask what inspired this scientific inquiry. The answer is simple: „Endless casts and many unsuccessful days on the water." At some point, we simply refused to accept that our technique, equipment, and baits were to blame. Something else was missing. We did not understand the behavior of our target. A long journey into the science of fishing followed.

This inquiry introduced us to unfamiliar territory. Suddenly, we found ourselves bombarded with hard data and figures. Although intimidating, we were amazed. As for the zander, we learned a lot about the pike's hunting strategies, drawing conclusions for effective baiting. Especially interesting is the research on the behavior of prey fish and their survival strategies. The contest between predator and prey, as between pike and roach, is captivating. Please, reach out to us if you share our fascination and wish to expand on this topic.

A strong passion for sharing knowledge motivated our publication. We present deep insights into the behavior of pike. We provide perspective on how, when and what pike hunt. You will learn more about the pike's preferred environment and discover the impact of varying temperatures and sunlight on its behavior.

We are confident that with this knowledge, you will be able to refine and accelerate your fishing. If we can quickly identify the best hotspots for pike fishing at different times of the year and in different waters, we will shorten our time spent searching significantly.

Before we proceed to chapter one, we wish to share a little bit about us: we are a blog and write after work in our spare time. We invest a lot of time and money into this passion—those scientific studies set you back a few bucks. We aim for about two to three studies to illuminate each topic in detail. For this book alone, we combed through 2,000 scientific pages, collecting, analyzing and summarising the information

into key points.

We also carry the editing, proofreading, layout design, printing, and Marketing ourselves. As we are not represented by a publishing house—not that we would know any—our Marketing so far is mainly driven by word-of-mouth, our friendly blog, and Facebook. We apologize in advance, should you find our Facebook posts annoying. Due to the time we spend writing our books, so far we have only managed to publish a few articles on our blog. We hope to improve in this area. Stay tuned for next year! Have fun!

Fishing Technology

„Roughly 90 percent of the fish stock restricts its movement to only 10% of the lake area.“

So how do we locate that 10 %? To complement our book, we leverage various tools to aid our search for the best hotspots. Modern technology enables us to take a closer look at the behavior and habitat of our target, allowing us to locate the best fishing spots for each context.

Scientific Studies

Since fish are an indispensable economic resource for humanity, it is only logical that a large number of scientists are exploring different topics and questions on all fish species. We consult these studies to draw conclusions on the behavior and habits of different fish. We learn about their hunting strategies, defensive tactics, prey preferences and how they react to changes in the environment.

Fish finder

fish finders help us to map out a water body. Acoustic signals are used to create an optical image of the underwater world for the human eye. This image helps us to locate the best hotspots for our target fish. Stationary fish finders, which are used on boats, are well known. However, the technology has gotten smaller, and we are now able to do the same thing from the shore, launching mobile fish finders to locate hotspots and fish.

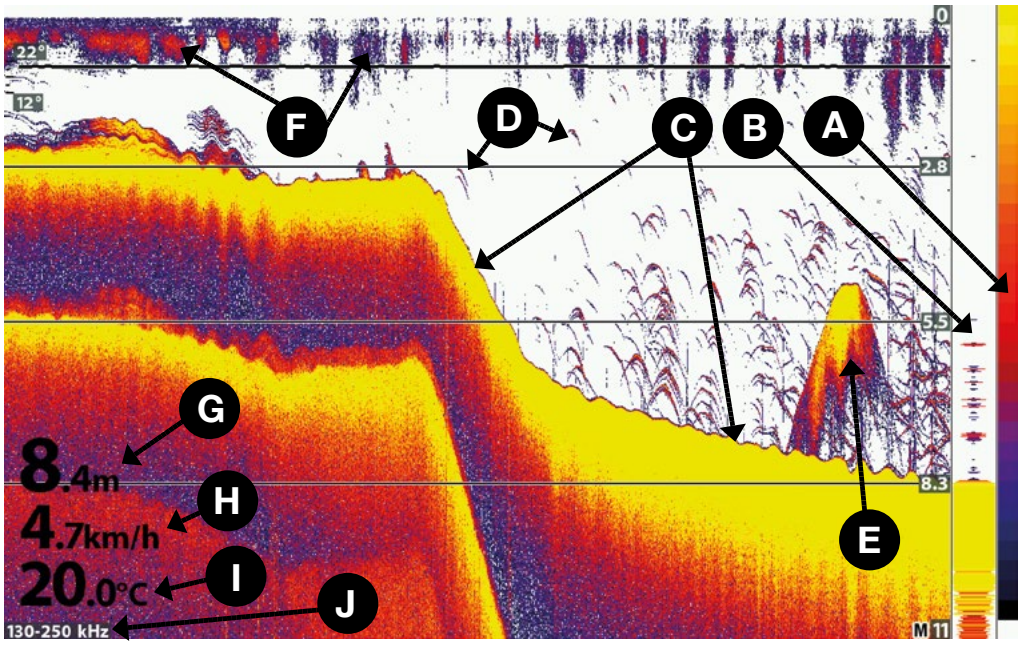


Figure 0.1 — Reading a fish finder image

Legend

A. Color scale (yellow hardest echo - dark blue weakest echo)
B. Depending on setting: A-Scope (real-time display) or RTS display
C. Bottom line
D. Individual fish
E. Swarm of fish
F. Surface defects
G. Current water depth
H. Current boat speed
I. Current water temperature
J. Current encoder frequency

Bathymetric charts

Water maps with depth date are another great resource to help us find hotspots for our target fish. The depth data allows us to identify slow and sharp drop-offs, holes and humps. This way we can quickly locate different spots that might provide shelter for our target fish.

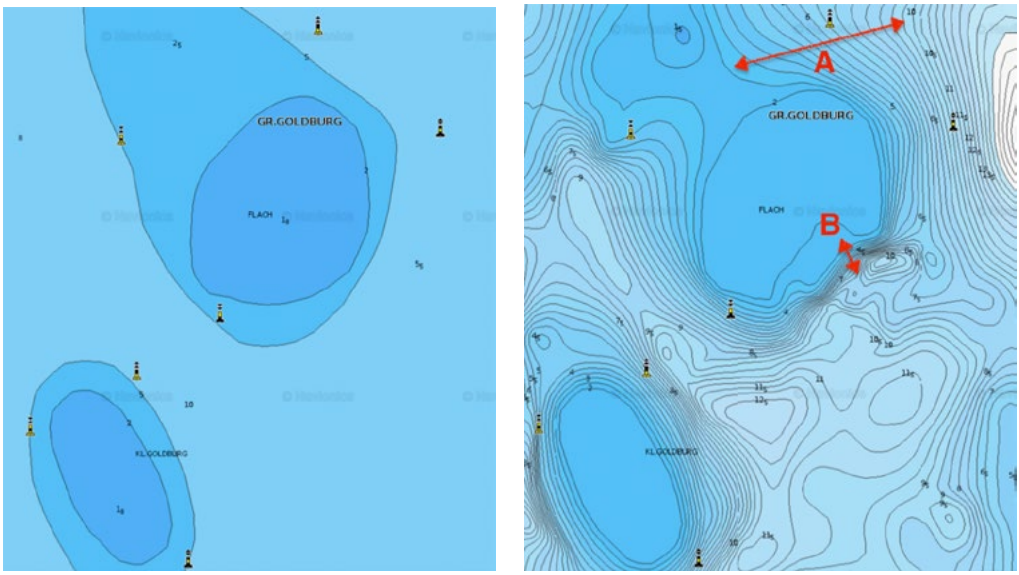
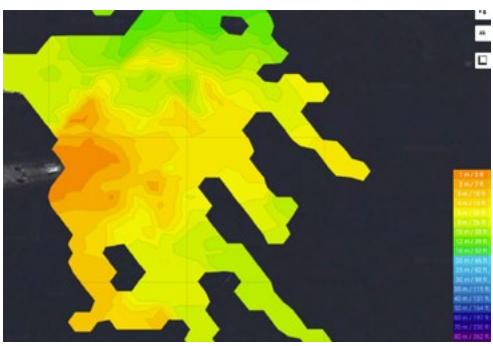


Figure 0.2—Bathymetric chart

Simple maps with depth contours show humps and holes under water. However, with these maps, we only get a rough impression of how the structure changes. Bathymetric charts on the other hand show depth changes at distances such as 0.5m, giving us a pretty good idea of the slope of each edge.

To get a first impression of a respective water body, we consult the chart viewer from Navionics to plan our fishing trip.

You can access it at https://webapp.navionics.co



On the water, we then produce bathymetric charts with our fish finder. The big advantage here is that you can store these charts, allowing you to navigate back to the desired hotspots and edges at a later point.

Figure 0.3—Bathymetric chart - Deeper

Depth thermostat

Figure 0.4—Depth thermostat

A digital depth thermostat enables us to measure the water temperature at different depths. The thermostat is lowered from the boat into the water by a long cable. It records the respective temperature at each depth. As you lift the thermostat again, you can read the stored values and distinguish the different warm and cold water layers. You can also easily use the thermostat from the shore by casting it towards the desired spot. Some fish species adapt their behavior according to temperature variations, so knowing the temperature of each depth may be all it takes to turn an average fishing day into a great one.

Do you like the pike illustration?

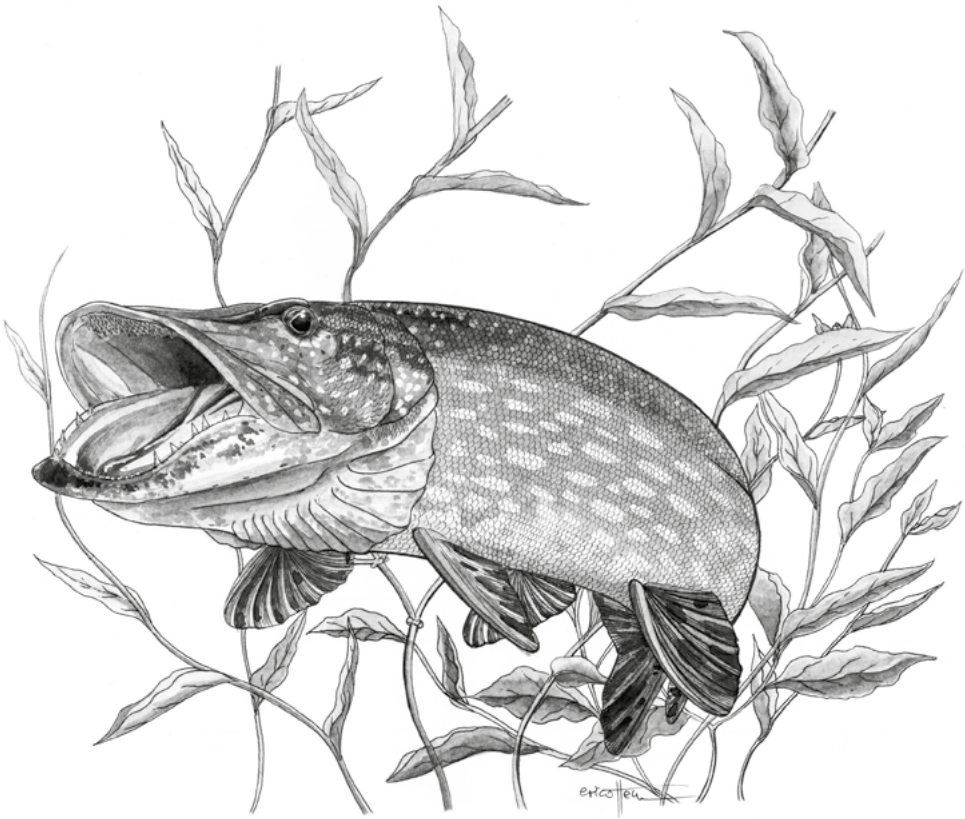


Figure 0.5—Pike illustration by Eric Otten

Get the pike motive on different products in the shop of „Dicht am Fisch“.

The guys from DaF now have a variety of artistically sophisticated fishing motifs.

Via the following link you can have a look at the lovingly designed products: www.Shop-DaF.de

Chapter 1

The pike

1.1 The Esocidae family

Esocidae is the family name of up to eleven different species. Our pike, Esox lucius, belongs to the subgenus Esox. It is spread over the entire northern hemisphere from Asia over Europe to North America and is high on the list of the most common fish species. We can trace pike from China to the Chukchi Peninsula—the outermost point in eastern Siberia, across Russia to Europe.

In Europe, pike can be spotted in Finland and Sweden, but also in northern Italy, France and the west of Spain. Ireland and Great Britain always promise great catches for pike photos. In Africa, you can find Esox in Morocco. In North America, the pike—the northern pike—is widespread in large parts of Canada and up to the north of the Ohio River, USA.

The exact origin of the species Esox lucius is controversial. Many scientists believe that Europe is the cradle. However, some recent findings and various DNA analyses suggest that the species might have originated from North America. Wherever Esox originated from, since the same species exists in both Europe and North America, it must have spread just recently. One can only speculate about the exact time.

The pike is a predator and has survived not only ice ages but also heat waves. It has proven its incredible adaptability to a wide variety of habitats. It is not without reason that we regard pike as top predators that make for fantastic catches.

1.2 The species of the genus Esox

- Esox lucius - Pike (Europe), Northern Pike (North America)
- Esox reicherti - Amur Pike
- Esox masquinongy - Musky
- Esox niger - Chain picker
- Esox americanus - Redfin and Grass Pickerels
- Esox cisalpinus - Southern Pike (recently discovered in Italy in 2011)
- Esox aquitanicus - a species newly described in southwest France in 2014

1.3 Esox lucius – The predator

We have discovered a lot about the pike. We can look back on many decades of scientific records. However, despite its importance to us, we have not yet succeeded in cultivating it on a large scale and breeding it for consumption in tanks and basins.

Pike can live up to 30 years. A few pike have broken the 45 lbs (20 kg) barrier—it is usually the females that hold these records. Pike in Europe and Asia are about the same length and weight. The conspecifics in North America, except for a few exceptions, usually do not grow as large. Here, the Musky tends to top the charts for both weight and length.

The pike can adapt itself optimally to its environment across different life stages. At a young age, it is covered with stripes so that it blends visually with plants and the environment. Once its size no longer allows it to hunt the shores effectively, the stripes give way to a dotted pattern, and the pike moves its habitat closer to the edges and

the open water. Here, it blends with fine particles, the turbidity of the different water layers and the darkness of the depth.

Figure 1.1 — A pike ;-)

1.4 Profile - the pike

Family:	Esocidae
Genus:	Pike
Species:	Pike
Latin name:	Esox lucius (Linnaeus, 1758)
Size:	males up to approx. 40“ (100cm)
	females up to approx. 60“ (150cm)
Weight:	up to 65 lbs (30kg)
Age:	15 to 30 years
Color:	dark brown to green with white/yellow stripes/dots
Eyes:	round, protruding
Food:	Fish, invertebrates, rodents, frogs,
	lizards, water birds, etc.
Distribution:	Northern hemisphere, latitude 40 to 52
Habitat:	clear to slightly turbid waters, standing or flowing,
	fresh or brackish water
Depth:	up to 100 ft (30 m)
Natural enemies:	full-grown only humans
Sexually mature:	from approx. 1-3 years or approx. 15“ (40cm)
Spawning season:	in spring at water temperatures of approx. 6-12°C
Oviposition:	1-700 eggs per sqm -
	eggs are laid in several batches (1-60)
	Depth: mostly shallow, less than 3 ft (1m)
Characteristic:	dependent on ample vegetation until late adulthood

Chapter 2

Bodies of Water

2.1 Inhalt

2.1 Not all waters are created equal

Waters play an incredibly important role for us humans. They are essential for water supply, the industry as a coolant, nutrition, and leisure sports such as boating and fishing. Humanity straightens banks and unloads garbage and sewage into lakes. All this has a pronounced impact on plants and fish.

Waters differ in many ways. Some are rich in nutrients and plants, while others are sparsely overgrown. They vary in structure, size, water quality, flora, and fauna. Standing waters such as seas or lakes and also flowing waters such as rivers or some dams are independent ecosystems—some larger ones may even accommodate several ecosystems. Both internal and external forces shape waters. For example, nutrients can enter the water via connected watercourses, nearby land areas, groundwater, springs, precipitation or from the air. Variations can occur at different times, causing the living conditions to change over the year and throughout the course of a day.

Various factors have different effects on the water itself, the structure and the life within. Since it would be a herculean task to investigate all potential influences and distinguishing features in correlation, we will focus on those factors which we deem essential, especially in respect to pike fishing.

Let us begin with a distinction between flowing and stagnant waters. In flowing waters, there is a constant flow of numerous substances. They often connect large parts of landscapes and change from the source to the estuary. Starting on page 205, we have dedicated an entire chapter to the unique features of flowing waters.

Standing bodies of water emerged in abundance in the northern hemisphere during the last ice age and often act as reservoirs. A large variety of substances accumulate in them. While many lakes have a natural origin, there are some artificial waters such as reservoirs, dams, dredging lakes or ponds.

Standing bodies of water are either fed by groundwater (still water) or form along a river course—or at its end, and thus have a constant supply of water. A combination of groundwater and river water is also possible. This is important for nutrient supply, the existence of prey and spawning grounds. Some lakes connect by rivers, so that fish have much more freedom to move and can switch between these lakes depending on the season.

Standing waters are essential habitat for pike. It is, therefore, necessary to understand the characteristics of these waters. Whether sea (brackish water) or lake, the structures, and water composition have a decisive influence on the way of life and behavior of pike. If, for example, the lake has mainly sharp drop-offs, hardly any shore vegetation can develop. This, in turn, means that there are very few spawning grounds for prey fish and hardly any habitat for pike. On the other hand, waters with extensive shore zones and different structures make for great habitats.

Lakes evolve naturally over time and generally become shallower until they silt up and only dry land remains. This process is called lake aging and by means such as intensive nutrient supply, has been considerably accelerated by humans over the last 150 years. These influences sometimes have short-term effects on fish habitat. In some

waters, fish are forced to adapt to entirely new conditions across the span of just a few years. Sometimes there are also long-term consequences that lead to permanent change. For example, many fish species are disappearing, or recede into the background with a diminishing population size.

The long-term effects are often not immediately apparent to us, causing us to overlook them. For example, some underwater plants are disappearing and displaced by other species. That, in turn, has an impact on the spawning grounds of the fish and ultimately on the fish population. Fish also start to interact differently with one another. Old species disappear, and new ones emerge. When the prey changes, predators must adapt their hunting strategies to survive. The perch as the main prey is then replaced by roaches or crabs. For us, this means that we have to restructure our bait box. So while grandpa‘s classic blinker imitated the whitefish, today we may need a bait that imitates the perch. But for us to come to this conclusion, we first must understand these connections.

2.2 The physical classification - The zones of a lake

We can divide a water body into two zones: the pelagial and the bottom zone (benthal). We can further divide the bottom zone into the littoral area, which is overgrown with plants and inhabited by many fish, and the lightless, nutrient and oxygen-poor bottom area (profundal) in the depth of the lake.

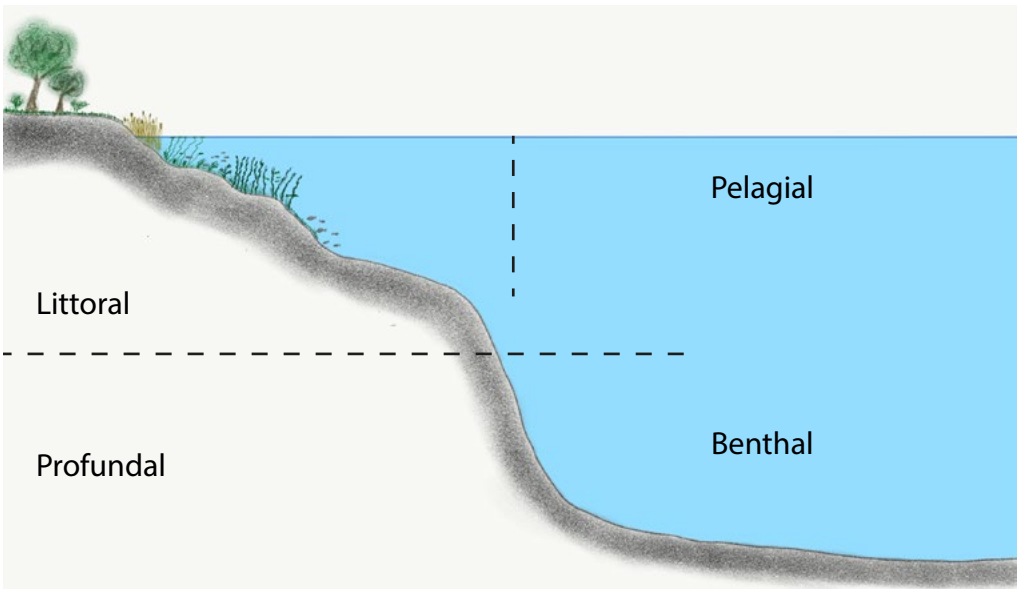


Figure 2.1—The zones of a lake

The **littoral** is the overgrown section of the lake. It has different definitions but is usually as deep as the light is sufficient for plant growth. In clear, mostly oligotrophic waters, the shore area can reach a depth of about 100ft (30m). As already mentioned, the depth is not static and varies depending on the water body. Since most waters are quite nutritious, plant growth is limited to a few feet / meters.

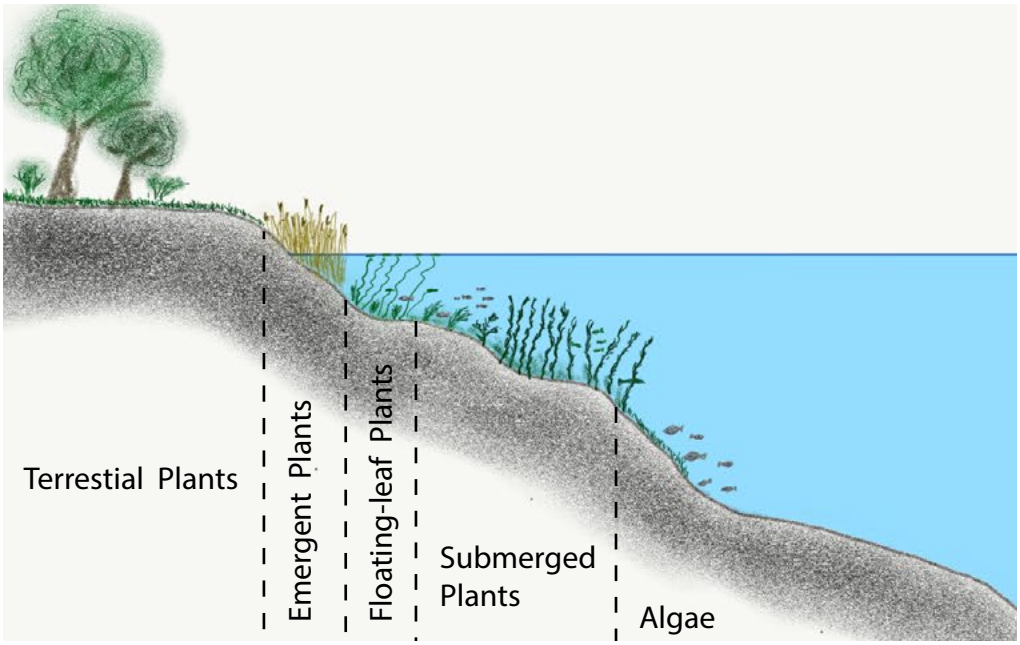


Figure 2.2—Plant zone littoral

It is easy to observe how the vegetation changes from the shore to the open water. We require a sound understanding of the underwater vegetation, as it greatly influences the life of pike and our fishing.

Inhabitants of the littoral:

Fish, snails, frogs, insect larvae, crabs, and more.

Plants no longer cover the **profundal**. Light hardly reaches here. The temperature is almost constant at 39°F (4°C). At these depths, oxygen is scarce. Plant life cannot exist here. Despite all that, this is a fascinating space. For many invertebrates such as plankton or crabs, the bottom zone serves as habitat. Prey fish find a richly laid table and attract predators like the zander.

Inhabitants of the profundal:

Chironomids, mussels, water lice, mud tube worms, and more.

The **pelagial** is the second largest area of a lake. Large pike either regularly visit the open water or have entirely relocated their habitat to this area. It is directly adjacent to the overgrown shore but lies above the bottom zone in deeper water. The pelagial is the light-flooded upper layer of the water.

Inhabitants of the pelagial:

Plant and animal plankton, plants, fishes

2.3 Classification based on nutrient availability - the trophic state of waters

We humans need rules. At least a few of them make life a lot easier. The trophic system index makes it possible to classify a water body according to its nutrient content. Of course, here we are not trying to classifying water as either drinking or bathing water—no, from this perspective murky water can actually be just as good as clear water. Instead, the trophic system index aims to classify bodies of water so that we can compare them. In this context, the available plant nutrients as the basis for phytoplankton play a critical role. Plants are by far the largest group of living organisms in terms of mass and are the starting point for all food webs. The trophic system index allows us to quickly classify a water body and, for example, to estimate the existence of certain prey fish.

The local pike are specialized in their hunt for certain prey fish and frequently focus on one or two prey species—which two exactly varies over the year. They know how best to ambush and attack their prey. If your bait falls into the pike‘s prey scheme, this is a big advantage. For this reason, a basic understanding of water as a habitat for the pike and its prey is necessary.

One example is the underwater visibility. It varies between the different trophic states. A change in visibility forces the pike to adapt its hunting strategy. The clearer the water, the more visible the prey/bait is to the pike. In this context, the appearance of the prey/bait matters most. On the other hand, in murky waters, the outline and vibration of the prey/bait take a leading role—appearance plays a less significant factor.

Remember

We can record the following: The pike is an efficient predator and adapts its hunting strategy between prey fish. We should remember this when choosing our bait. The pike knows how a perch or roach flees and can prepare its hunt accordingly. In the case of new prey, the pike does not instinctively know how it will react. We conclude that an unknown prey will get one pike curious while leaving another cold.

Why do we assume that? Various studies have shown that pike prefer one prey species over another. If there is a multitude of prey fish, many pike will choose the prey they know. At the same time, the turbidity of the water also plays a significant role in terms of prey selection and hunting strategy

Remember

The trophic state gives an indication of which fish are predominant. Since the pike is a highly specialized predator, this enables to make a more informed bait selection. A basic understanding of the water can guide us in many ways: We find hotspots faster. We can choose the right baits and save money. And we have more time to fish.

2.3.1 Determining the trophic state

Only a few simple parameters have to be consulted to determine the trophic state of a water body. For smaller lakes, we examine, for example, the chlorophyll content, the visibility depth, and the phosphorus content on at least two different points in time. Understand, a scale derived from this is much easier applied to lakes than to rivers. A river does not behave the same from source to estuary and may have different trophic states along its path—their catchment area is often considerably larger, and if the river is dammed in between, the dams must be classified individually as well.

An example shows us that one and the same water body can have different trophic states. In 2014, the Müritz, the second largest lake in Germany, was divided into a weakly eutrophic part (Außenmüritz) and a mesotrophic part (Binnenmüritz). In 2012, both areas were still classified as mesotrophic. Such changes are possible if researchers conduct the inspection at the boundary between two trophic classes.

The tropic state is never 100% accurate or constant. The measured values used to classify the trophic state give only an indication of what might be the correct level but can vary from reality. There are five main groups. The process of increasing nutrient accumulation in a water body is called eutrophication. It has both natural and artificial causes.

Factors that determine the degree of eutrophication:

- Water bodies of different age groups often, but not always, have different trophic states. The older the water, the shallower, sediment- and nutrient-rich it is. That is the natural development of a German water body. It has developed over thousands of years since the end of the last ice age—south of the low mountain range, the development might even have started much earlier. However, not all waters with their origin in the Ice Age are in the same state of aging. The speed of the aging process varies from lake to lake and depends on a multitude of factors, with both the depth and size of the water playing premier roles. For this reason, even in relatively closely spaced waters, the aging status and tropic states may differ if the nutrient inputs are not the same. In the end, the water body silts up and only dry land remains—a water body with sufficient size and depth, Lake Constance, for example, can theoretically survive till the next ice age. However, let‘s not think that far ahead.
- Humans accelerate this development. The amount of algae production is mainly determined by the concentration of phosphorus and nitrogen in freshwater and seawater. However, both elements are also present in large quantities in fertilizers and wastewater. Nutrients can settle in the sediments, but under some circumstance, can also dissolve again in the upper parts.
- The distance to a nutrient source determines how many nutrients can enter the water body. In the vicinity of agricultural land, the potential inflow of nutrients is unquestionably higher than in the heart of a forest.
- The length of time the water remains in a catchment area. The dwell time in standing waters is greater than in flowing waters. This increases the probability of eut-

rophication, as nutrients are constantly added to the already enriched water.

- And more

2.3.2 Increasing eutrophication and fish yield

The trophic state of a water body can change, for example, through the supply of nutrients. These nutrients cause increased sedimentation, which commonly develops slowly over hundreds and thousands of years, making the lake shallower as it ages. The change in trophic state that starts from the oligotrophic state is called eutrophication. This process, when slow, is a naturally occurring lake aging process, causing changes in species composition and biomass. Oceans like the Baltic Sea are also affected by eutrophication.

Within just a few decades, however, man has managed to accelerate this process radically for many waters. Nutrient inputs from agriculture, sewage treatment plants, and other sources enrich the nutrient content in oceans, lakes, and rivers, causing existing plant and animal life to change much more rapidly.

In an oligotrophic lake in Maine (USA), for example, a sediment layer of 20“ (50cm) has formed over a time span of 1,500 years. In the eutrophic lake Erken, Sweden, it took less than 200 years. In our German waters, rates of 0.04-0.3“ (1-7mm) sediment growth per year are now considered „normal.“ In artificial waters, this process progresses at an even faster rate but without a high nutrient content.

The question for us anglers is: What effects does eutrophication have on our fishing? Here is the short and sweet answer: Eutrophication affects the fish stock composition. There are good news and bad news. The good news is that the stock of predators such as eel, zander, and pike increases at higher trophic levels.

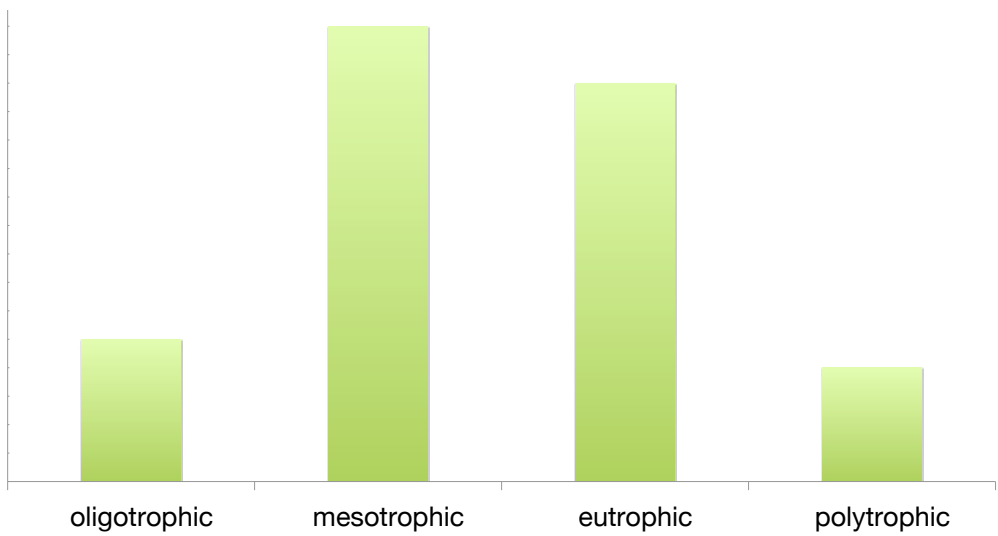


Figure 2.3—Pike yield as a function of the trophic state

What effects does increasing eutrophication have on fish species? The German marine scientist August Thienemann (1882-1960) has formulated an answer to this question. Let‘s start from the oligotrophic lake. Here, we have a higher variety of species because of many diverse living conditions. However, the number of fish per species remains low. At higher trophic levels, species variation decreases while the population sizes increase. Living conditions are restricted. That is the natural course of eutrophication.

If, for example, there is an increase in nutrient supply, algae start to form which clouds the water. The sun‘s rays can no longer penetrate to the bottom. As a result, plant growth stops at greater depths, resulting in many fish losing their valuable hiding spots. In addition, the oxygen content often changes drastically, so that oxygen-poor zones form, which are no longer inhabitable. In autumn, in extreme cases, deep water with toxic components such as hydrogen sulfide may even reach the surface causing fish to die.

Without the vegetation, the composition of the soil inhabitants also changes. Fish that eat plants and microorganisms find less food and are less numerous. Their numbers inevitably decrease. Other species use the unlimited zooplankton as a new food source. These changes can occur sporadically throughout a year or be long-lasting. All this has temporary or permanent effects on predators such as the pike. The pike must adapt to the changing conditions and adjust to other prey. So if you happen to be using the same bait all year round, you are ignoring that life underwater is in constant flux.

2.3.3 The five levels of the trophic system index

Level I: The oligotrophic lake

Oligotrophic waters have a high visibility depth all year round. Phosphorus and nitrogen only occur in small quantities. The visibility depth is high, and can easily range from 10 to more than 30 feet (3 to more than 10 meters).

With few plant nutrients, the incidence of light is high, creating a sparse but diverse underwater vegetation far into the depths. We can find oligotrophic waters mainly in wooded areas. The production of plankton and more developed plants is low, which severely limits the nutritional basis for the fish living there. Only a small number of prey fish reside in these waters.

The bottom of such a water body shows only small deposits, mainly created by dead plants and fish over centuries. Due to the high concentration of oxygen even at high depths, phosphorus cannot dissolve from the sediment. That has significant effects on the thermocline that builds during summer (see chapter 4.2 „The temperature“ on page 64ff).

The thermocline in oligotrophic waters does not force the fish to the surface. However, it is precisely this layer that often gets recommended as a pike hotspot. In oligotrophic waters, this tip is useless, because with a high incidence of light, algae are growing on the lake bottom, magically attracting prey fish and predators. So those who in these waters rely on this one-size-fits-all tip about the thermocline will go home empty han-

ded more often than not.

Oligotrophic lakes are quite rare. In Europe, there are some naturally formed land and mountain lakes which researches have classified as oligotrophic. European smelt and trout feel particularly at home in these lakes. They are important prey for the pike, and the clear visibility conditions suit this visual predator well. The pike is also a cold water fish and feels at home in the cooler temperatures.

On the downside, oligotrophic waters often have sharp drop-offs and sometimes very narrow shore zones. The space for sufficient vegetation is small therefore a large pike population can hardly develop. More often large pike from connected rivers migrate into oligotrophic waters to hunt the fish living in open water. They then return to the rivers or adjacent lakes for reproduction. If one looks at the depth contours of oligotrophic waters, one can quickly make out the few expansive shore zones.

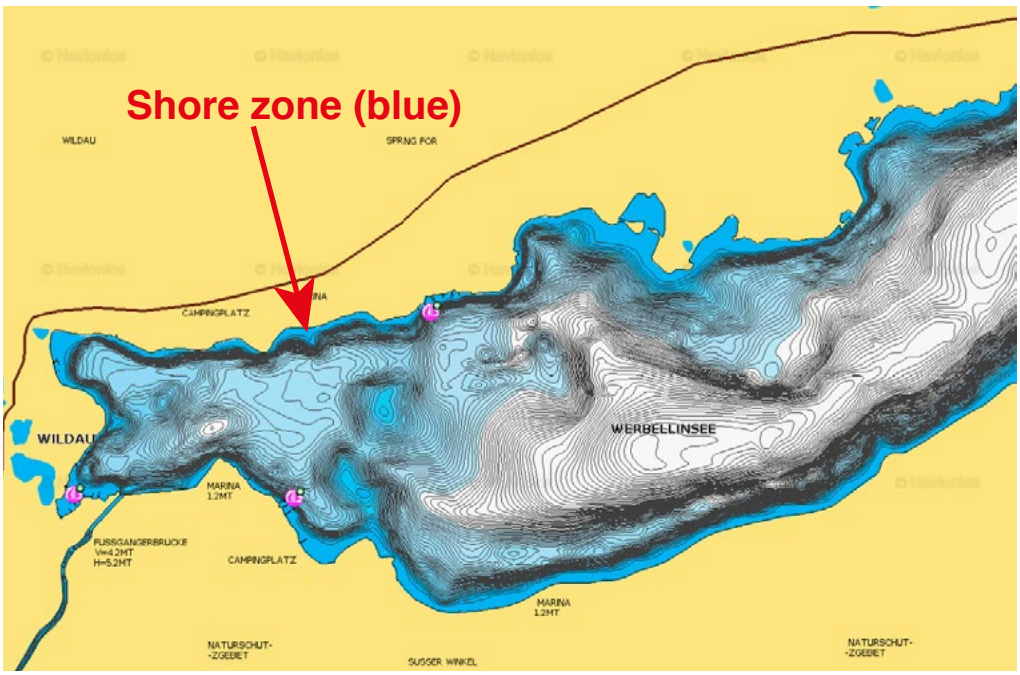


Figure 2.4—Shore zone Werbellinsee

Remember

Because of the clear, deep and nutrient-poor water, only a few whitefish inhabit oligotrophic waters. That has a big impact on the prey selection of the pike. The prey includes vendace, trout, European smelt, zander, and perch. Here, „predators hunt predators“ is the rule. Take this into account when choosing your baits. Place baits that imitate predators at the top of your bait box. Medium-sized pike concentrate in the few larger shore zones. The big ones prefer open water. The pike population itself is usually not very large, as there are only a few small shore areas for the young pike. Cannibalism is low when enough other predators are available as prey. If they are missing, the larger pike start to hunt the smaller ones.

Level II: The mesotrophic lake

In a mesotrophic lake, quantitatively more plants and animals occur. In the summer, the water shows high visibility depths of 6-15 ft (2-5m), depending on the type of lake. Occasionally, lower visibility depths may occur, especially in spring. The species diversity of aquatic plants is somewhat lower, while their number or biomass is higher than in oligotrophic lakes, leading to a larger fish population. Studies show that the quantitative occurrence of predatory fish in deep mesotrophic lakes is relatively high.

There are mesotrophic lakes with eutrophic stretches of water. In 2014, researchers divided the Müritz, the second largest lake in Germany, into a weakly eutrophic section (Außenmüritz) and a mesotrophic section (Binnenmüritz). In 2012, both areas were still classified as mesotrophic. Such changes are possible if researchers conduct the inspection at the boundary between two trophic classes.

On all lakes with a depth of more than 15 ft (5m), which are not too strongly flooded, a sprinkling layer forms during summer. This also applies to deeper lakes. In contrast to oligotrophic lakes, the oxygen concentration at deep depths is usually low. Either the oxygen content is sufficient for a higher life or not. If it is not enough, all fish—prey and predators—are forced above the stratification and into the upper water layers. Here, they are easier to reach for us.

Remember

Mesotrophic waters may be very diverse and demanding fishing grounds. The visibility in mesotrophic waters is often above 6ft (2m) and the pike can locate the bait well. What they see will have a decisive influence on the hunt. The appearance of the bait plays an essential role in outwitting the pike.

Level III: The eutrophic lake

In these lakes, we have an even higher production of biomass such as algae, plank-

ton, plants, and fish than in mesotrophic waters. Together with the polytrophic lakes, eutrophic lakes are numerically predominant. The water is rich in nutrients. There are stratified and unstratified eutrophic lakes. In the stratified lake, the conditions during the vegetation period make the deep regions almost inhabitable. Fish can only stay there temporarily or not at all. The visibility, which changes throughout the year, is turbid, which has an impact on the hunting strategy of the pike. In eutrophic waters, oxygen deficiency can occur when plants and fish consume more oxygen at night than is produced by photosynthesis during the day.

Surface plants lushly cover the banks, and the water surface has a belt of surface and underwater plants. However, this belt is limited to a depth range of 6-10ft (2-3m), as the visibility depth is very shallow at less than 3ft (1m)—the incidence of light is low. The soil is partly muddy due to the abundance of plants and algae dying off in autumn.

The fish stock composition has changed compared to the mesotrophic water. Above all, the biomass of fish is significantly higher due to a better nutritional basis. More plants and more plankton lead to more fish. In plain language, this means that there is much more fish than in other types of water. The most relevant predatory fish in eutrophic waters are perch, pike, and zander. However, the dominant species in such a well-nourished, turbid lake are carp-like fish, such as bream, roach, and more. Robbers can find enough prey and grow very well.

Pike are abundant in eutrophic waters. The usually higher water temperatures are ideal for the development of small pike—flat lakes warm up quickly and offer the optimal water temperature. The restricted visibility is often a limiting factor when hunting, especially for larger pike.

Remember

Hunting is challenging for pike in eutrophic waters, as visibility is often very turbid and varies over the course of the year. That influences the hunting behavior of predatory fish to varying degrees. At lower visibility, the pike must rely on senses other than its eyes. The senses of smell and hearing, and also the lateral lines gain in importance. For us, this means that pressure-wave and sound-generating baits should top our bait boxes. Eutrophic lakes are often shallow and have lush vegetation in the shallower areas. There is an abundance of pike so that cannibalism, food competition and even the defense of the territory cause them to collide. We must be conscious of the relationship between the trophic state and the pike‘s population size, behavior, and prey.

Level IV: Polytrophic lake

In the polytrophic lake, we find more biomass as a food source for fish. However, there is one major limitation: the deep zone in stratified lakes is oxygen-free and sometimes already contaminated with toxic compounds which can be very dangerous for the fish. The large production of plants affects the water and creates an alkaline environment.

Although the high plant biomass produces an abundance of oxygen during the day, it regularly consumes the same amount of oxygen at night and removes it from the fish. Particularly in early autumn, when the plant biomass dies, not enough oxygen gets produced. The bacteria which then decompose the dead plants, temporarily consume almost all of the available oxygen.

The living conditions for fish can then be extreme. The fish usually adapt well to these situations, but in some years, fish mortality may be high. In midsummer, the oxygen content in the water is reduced at night, which some fish do not survive. In winter, the shallower polytrophic lakes can easily freeze over, potentially causing another large-scale fish-die-off. If during winter, snow covers the ice, too little light enters the water for sufficient photosynthesis. The result is a so-called winter killing, which occurs every few years depending on the water—polytrophic waters are more frequently affected than waters with lower trophic states. In most cases, however, only part of the fish population is affected by the winter killing.

Remember

Polytrophic lakes frequently have perceptible turbidity and a very muddy bottom zone. Visibility is limited to a few inch / centimeters. The plant population is often confined to surface plants in the shore zone—the visibility conditions considerably impair underwater plants. Since the pike is a visual predator and requires underwater vegetation for its development, polytrophic waters offer a rather poor living environment.

Level V: Hypertrophic lake

The hypertrophic lake holds even more nutrients so that the problems mentioned for polytrophic lakes intensify. Whether fish can survive permanently in such waters must always be examined on a case-by-case basis. Fish that require less oxygen have better chances of survival. At least 10% of leased waters are hypertrophic in nature.

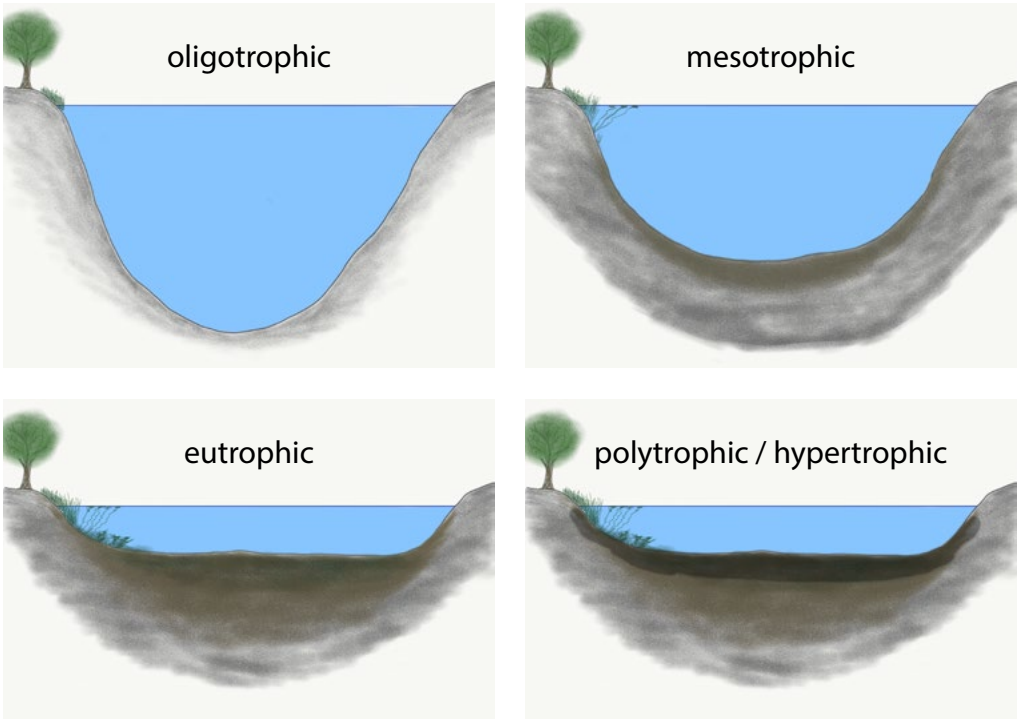


Figure 2.5—Overview of the trophic levels

Remember

In summary, we can say that the respective nutrient content of a water body has a decisive influence on plants and fish. The trophic level of a water body is not a fixed value—it can fluctuate regularly or change permanently. Water management measures taken in recent years have us hopeful that the trophic level of a few lakes will sink slightly, for example from slightly eutrophic to mesotrophic or from polytrophic to eutrophic. Once again it becomes clear that there is a noticeable relationship between the trophic level of a lake and the pike population, their behavior, and prey.

In nearly all lakes with a depth of 15ft+ (5m+), which are not too strongly flooded, a thermocline forms in the summer. That also applies to deeper mesotrophic and eutrophic lakes. In contrast to the oligotrophic lakes, the depth area is less oxygen-rich. Either the oxygen content is sufficient for a higher life or not. If it is not enough, all fish—prey and predators—are forced above the stratification and into the upper water layers. We will go into the subject of the thermocline in more detail in chapter 4.2 „The temperature“ on page 64ff.

The trophic state of a water body affects not only the food but also the reproduction of many water dwellers. Many other environmental factors like temperature, weather, light, and more, are also impacted by the trophic state.

Chapter 3

Hunting and prey

3.1 The pike and the hunt

Pike hunt easy prey. Like any predator, it weighs the benefit of an attack against the probabilities of success. That is the only way to save energy and to feed efficiently. To us, one pike is like another, but in reality, each specializes in different aspects. One pike is more successful at attacking large prey fish, while others are better at attacking smaller ones. Also, the choice of prey is heavily dependent on the environment in which a pike forages. The varying thickness of the vegetation requires different defense strategies on parts of the prey, resulting in the predator to have to adapt its hunting methods accordingly. If there is no vegetation, prey and predator behave differently once again. In this game, everything revolves around the most efficient hunting and the best possible escape strategy. The pike is optimally adapted for hunting. Its prey is equally well prepared to defend itself. We should always be aware of this fact.

3.1.1 Sharp teeth

The head of a pike is long. If it were an arrow, its head would be the arrowhead. There are two reasons why the pike is such a successful predator: its eyes and its teeth. It has razor sharp teeth and lots of them. These sit in the jaw but also on the facial bones and palate. Some of them are slightly bent backward to prevent the prey from escaping. Anyone who has ever felt the teeth of a pike knows how sharp these little knives are. Hardly any prey escapes a pike once it has grabbed it and can concentrate on it.

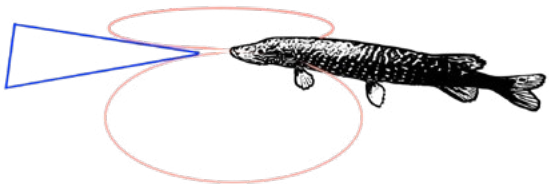
3.1.2 Power and speed

Not only the pike‘s head but also its fins make it a successful predator. Its fins are arranged in such a way that it can accelerate quickly from a hiding spot and grab its prey.

Like a torpedo, it can pick up speed and push forward. However, what is an advantage in some contexts can also be a disadvantage in others because the pike cannot change direction quickly at high speeds. The pike is less agile than other predators when attacking. For us anglers, this means that too fast a bait can cause a missed strike. The pike is already forced to launch its attack from an unfavorable position. We should not reel too fast, or the pike will not be able to catch up.

3.1.3 The visibility must be unobstructed

The eyes of the pike are optimally designed to spot prey. They are essential for its hunting. Pike hunt best when they can see their prey. That allows the pike to estimate the circumstances and the probability of success. Only once its instincts have concluded a positive outcome, the hunt begins. It must keep constant visual contact with its prey. Sometimes, it may attack very quickly. Other times, it pursues the prey over a long time.



The pike has a broad field of vision created by its two eyes on each side of the head. It can detect even the tiniest movement in its vicinity. In the area where the vision overlaps, its eyesight becomes binocular, similar to humans—its eyes can see jointly and spatially classify an object. It can estimate depth and distance. Now, its instincts can calculate the attack.

Figure 3.1—The pike's field of vision

That is its attack zone. Here its chances of success are the highest. For an attack, the pike must look towards the prey. In other words, the prey or our bait must be in its binocular field of vision. It is of little use if we place the bait behind the pike. We have to give the ambushing predator time to take its attacking position. It is better and more promising if we can place the bait right in front of the pike.

Like the zander, the pike also has a light-reflecting layer called "tapetum lucidum" in its eyes. This layer reflects the incident light and sends it back to the photoreceptors which absorb it. This layer does not reflect light as well as for the zander, however, allows the pike to somewhat see at dusk, at night and even in the dark depths.

3.1.4 Olfactory perception or sense of smell

Pheromones and smells play an essential role in water. With the help of these scents, fish can accurately determine their location in a water body. Among other things, they serve for navigation. Fragrance traces are one reason why fish find their way back into certain waters.

The pike is not only a visual predator. Nature has given it other senses, too. It has a nose for signals from, for example, injured fish. These are easy prey, quasi a quick snack around the corner—quickly there and back home, returning to the comfortable couch.

The odors are perceived by different odor receptors, not only by the nose. The pike uses pheromones to locate and identify its prey. That way it can better assess the situation, for example, distinguish the species, estimate the distance, and define the injury status. The sense of smell helps the pike to hunt and escape. The worse the visibility gets, the more important the sense of smell becomes. However, do not confuse the pike with a shark. It cannot smell its prey from a great distance.

3.1.5 Camouflage

The pike is a master of the ambush and the ambushing attack. It is that which makes

it so successful. Its fins are shaped and colored as an extended camouflage so that potential prey cannot spot the pike. They are not colorful or bright; they are not intended to provide visual support in any way, for example, during courtship. The fins of the pike are its motor and can accelerate its large body at lightning speed. In addition to single prey, pike can also successfully hunt large shoals of roaches, minnows, and more by attacking them skillfully.

The pike is active as a visual predator mainly during the day and at dusk. It uses daylight for short expeditions in its territory. When it gets darker, its feeding behavior changes. The best biting times in many waters are in the early morning and the evening hours. Now, depending on the season and weather conditions, the pike can see well underwater to recognize its prey and launch an ambush. Aiding its chances of success is the fact that the defensive measures of some prey fish no longer work so well during these hours of the day.

3.1.6 The hunting process

Every hunt for prey follows the same pattern. The individual steps differ only in their duration. We will cover these circumstances on the following pages of this chapter.

1. Without regard to the prey: The pike floats motionless in the water. Possible prey fish do not interest it.
2. Attention to the prey: Its attention is shifting to the prey—the body is turning towards their direction. It observes but remains motionless.
3. The pursuit of the prey: Depending on the prey and the situation, the pike starts the pursuit if necessary. Slowly and inconspicuously. It is focused entirely on the single fish or shoal.
4. Sprint: The fins stand up and bring the body into position for a short but fast sprint. The instincts of the pike tell when the right moment has arrived.
5. The attack: It differs from prey to prey. For one prey, the pike attacks the head, for another the middle or rear. The attack ends if the prey has been caught or the first sprint was unsuccessful.

    A. Failure: Not every attack ends in success. Even if the pike is a good and fast predator, there are more false attacks than you might think. On the one hand, this is due to the excellent defensive strategies of the prey fish, on the other, caused by the conditions of the environment.

    B. Back to step 2 or 3: If an attack was unsuccessful, either a chase ensues, or the pike looks for another opportunity. The prey species and environment play a big role in deciding whether a second attack is launched. A pursuit and renewed attack depend on the prey/bait and whether the opportunity seems favorable.

6. Securing the prey: If the attack was successful, the prey is secured. The aim is to ensure that the prey sits firmly in the mouth. The pike can quickly secure it with its teeth. Depending on the size, this only takes a few seconds.

7. Holding the prey: After securing the prey, the pike will hold it for some time to find a safe place to feed. Once it is safe, the pike takes an additional few seconds to place the prey in the right position.
8. Get the prey in the right position and devour it: When it appears safe, the pike brings the prey in position. It turns the prey so that, depending on the size, the head points to its throat and the fish lies on the flat side. Now it can swallow the prey. Depending on species and size, this step can take a few seconds.

The more a pike specializes in a prey, the better its odds.

3.1.7 Catch a pike in 10 minutes

The pike is known as a speedy predator. It greedily throws itself at its prey. But how fast are pike? How long do we have to wait? You cast and reel with little or more variation. The goal is always the same: You expect a strike.

Let‘s upgrade our fishing IQ with a study on the hunting behavior of pike. As part of this specific study, researchers ran multiple experiments, each with one pike. One of the experiments examined the hunting strategies pike employ in their hunt for roaches. Both the roches‘ and the pike‘s behaviors were studied.

For the experiment, wild pike and roaches were caught and then placed into a pool together. The entire hunting process was recorded by video camera and subsequently evaluated. The researchers were particularly interested in the following points:

1. Number of attacks
2. Type of attacks (ambushing followed by a surprise attack vs. a chase)
3. The ratio of successful to unsuccessful attacks
4. Number of captured roaches
5. Time until the predator becomes active for the first time
6. Time from the first active action to the attack

Now, it gets interesting. In the 68°F (20°C) pool, almost all pike swam motionless near the bottom or hid near hiding spots. Even as the prey was placed into the pool, the pike remained motionless. In 35 attempts, 166 attacks were recorded, of which 25 were successful—a 15% success rate. The number of prey placed into the pool played a minor role in determining the outcome of the experiment.

Pike are known as ambushing predators. However, the researchers also documented various chases. Leading up to the first attack, the pike usually remained motionless or hid near two wooden beams—likely, the beams provided the predator with only a marginal advantage. Nonetheless, the pike hunted most effectively from this ambushing position. 17 of the 25 captured roaches were caught with this strategy. In those cases where the first strike failed, the attack turned into a chase more than half the time. However, the predators fared far worse with this strategy.

Up, up, the prey has arrived!

Contrary to expectations, the pike remained calm as the researchers placed the prey into the pool. On average, the pike took eight minutes to react to the prey. This is a big surprise. Who would have thought that pike swim alongside their prey in such a contained space without striking? Wow...

We don‘t even want to imagine how many baits must have passed pike with them thinking: „Hey ... prey ... looks interesting ... ups, it‘s gone already.“

The attacks themselves usually didn‘t last very long. On average, the first attack came to an end within two minutes. However, adding to this the eight minutes it took to peak the pike’s interest, we end up with a total of 10 minutes. 10 minutes is a damn long time for such a fast predator.

Remember

If we are to believe these experiments, pike, contrary to common belief, don‘t appear to be quick and agile predators. It seems pike take a lot longer to strike than the average bait spends in the water. Instead, the pike is an efficient predator, as proven by the 15% success rate—other studies even report success rates of up to 25%. The pike prefers to attack from an ambushing position. This allows the pike to locate its prey and to launch a surprise attack. The instincts of some pike seem to require this time to make a decision. That is not surprising, because an ambushing predator has time. It can wait for the right moment and the right prey.

What can we conclude from this study for our fishing?

It appears to be necessary to hold the bait in the pike‘s vision for as long as possible. But how can we best do this?

We assume that our success rate will increase if our baits appear more attractive to the pike—the duration the bait spends in the vision of the pike matters most. To achieve this, try to reduce the speed at which you reel.

Many wobblers, blinkers, and spinners are reeled in quickly. Lurking pike may not be attracted by baits that speed past them. If you cast heavy baits in shallow water, you will be forced to reel quickly as otherwise, your bait will shoot to the bottom. So, we suggest using a bait that floats or sinks just slightly. Such bait can remain longer in the water. Dead baitfish might be best suited to bridge the 10 minutes.

3.2 The pike and its territory

Often, we oversimplify the pike‘s territory, not doing justice to this adaptable predator. Young pike regularly have only one fixed territory. The risk of falling prey to a larger predator is high, so they seldom leave their small territory. In adulthood, the boundaries of their hunting grounds become blurred, and they have a larger radius of action. Studying this aspect of the pike‘s behavior is essential to our fishing success as it

allows us to reliably locate our target.

At this point, we would like to state that pike have a radius of action. That space can vary in size from a few feet / meters to several miles / kilometers. Within this radius, a pike can have one, two or even more areas. Depending on external circumstances, the pike occupies these areas for a few days, weeks or months.

The territorial behavior of the pike was first scientifically recorded in the 1940s and since then has been the subject of various other studies. One of the most famous studies dates back to 1977 when researchers investigated a 11 acres (4.5ha) lake shore, dividing it into 330ft (100m) wide sections. After the spawning period, the researchers caught a few pike with the aid of electric fishing—direct current in the water. These were marked and returned to the center of the catch zone. In autumn, the same pike were caught again. The results were astonishing. 80% of all the pike were caught within a radius of just 330ft (100m) from their place of release. 11% of the pike were caught between 330-660ft (100-200m) from the release spot and only 9% were caught outside of that range.

Other studies have come to different conclusions. Some pike in the river Frome, England, occupied different territories throughout the course of a study, which were sometimes several miles / kilometers apart. However, here, too, the scientists came to the conclusion that the occupied territories were much smaller than the radius of action. If there is enough prey, pike can hunt excellently in a territory of just 30 by 30 feet (ten by ten meters). If there is less prey, pike either increase their area or move to another one. This behavior protects the pike from crossing paths with other pike. Those who do not travel much will not meet conspecifics, reducing the odds of falling victim to cannibalism.

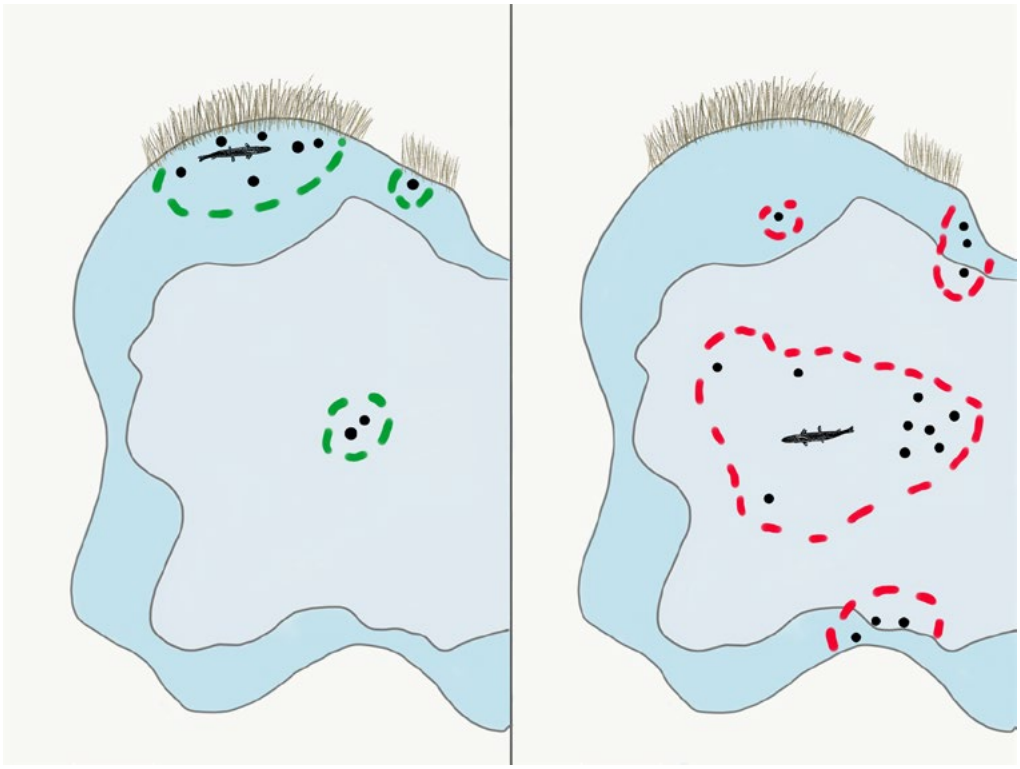


Figure 3.2—Two pike, two territories

The behavior of pike within their territory was also studied. Some pike did not leave their 30 by 30 feet (ten by ten-meter) area for up to eleven months. Others moved to the reed in the morning and back to the open water at dawn—they did this all summer long. We should also mention that there were big differences between the seasons.

3.2.1 Big pike - big waters - big territories?

In larger standing waters and rivers, the radius of action or the individual territories of some pike may be bigger. Some records describe an area of about 1 square mile (one to two square kilometers). In principle, larger waters offer more space, but most pike will hunt and live in a confined area. However, this does not mean that pike are only loyal to one territory. It is not unusual for spontaneous trips to obtain a new territory a hundred meters / feet or kilometers / miles away. Some pike also claim two or three areas at the same time.

However, during some seasons, many pike are more or less chained to their territory. Then they rarely leave, and if they do, return immediately. That is a defense mechanism. Pike are not disinclined to cannibalism. The territorial behavior protects them—those who do not travel much will not cross paths with conspecifics, reducing the odds of falling victim to cannibalism.

Nevertheless, there are those among the larger pike that do not respect the territorial

division. They do not limit themselves to their little water area but like to drop in on their neighbors, maybe to make easy prey. Naturally, these encounters do not always unfold peacefully. Should a territory become vacant, it does not take long, until another pike comes along.

A smaller proportion of the pike do not conform to the territorial behavior at all. They are more mobile and wander around often. These active pike are probably much more flexible in their prey selection, as they have to adapt to new conditions frequently. Their increased activity leads to a greater need for energy, requiring them to feed more often. If we evaluate several studies, we can see that approximately three-fourths of the pike population live and hunt in more or less fixed hunting grounds. These pike prefer to attack from an ambushing position. The other one-fourth of the population strays and actively chases their prey.

Remember

If we summarize the results of the studies known to us, we can say that the majority of pike display very pronounced territorial behaviors, carrying out all their activities in restricted areas. Although pike attack swiftly, their movement patterns are often slow and deliberate. The nature of the pike is to ambush their prey. They can remain motionless in their hiding spot for many minutes and wait for the right moment to attack. Anyone who has the opportunity to observe pike in a freshwater aquarium, such as the Müritzeum in the Mecklenburg Lake District, may enter a game of „Whoever moves first is dead“ with one. Just know, the pike is likely to win. There is a good chance that the pike will stay in the same corner of the aquarium for the entirety of your visit.

However, not only the motionless dwelling but also the territorial behavior has a strong influence on the prey selection. Because only what is available can be eaten. That becomes all the more obvious when we consider that the pike waits motionlessly for many minutes in the same place, hoping for a lucrative opportunity to present itself.

3.2.2 Ambush attack or active predator?

The hunt we must observe with a certain detachment because in comparison to other fish species most pike move very little. They are active only very sporadically. Long periods of immobility follow short trips. The bulk of the pike‘s activity consists of short sprints when hunting for prey. The vast majority of pike are ambushing predators. Hunting from an ambushing position affords the pike a decisive advantage over its prey—the pike has the element of surprise on its side. Its prey loses precious time, having to react first. We can say that the more cover the pike have in their territory, the more ‚sneaky‘ they get.

The vegetation influences the pike‘s hunting strategy and behavior. Lurking predators tend to float motionless in the water for many minutes. The pike does this particularly

well. Records show time intervals of 30-60 minutes in which pike remain motionless.

As already mentioned, a smaller portion of the pike population is more active in their search for food and travels long distances to hunt prey. Camouflage is less significant to these pike, with speed and perseverance taking the leading roles. The time that active pike allocate to motionless resting ranges only from 10-20 minutes. So we can see, there are two different types of pike. How do you fish for one compared to the other?

3.2.3 How to catch a motionless ambushing predator?

The two types require different fishing tactics. An active pike is easier to catch than an ambushing one. Those that move are a lot more likely to cross paths with our baits. Also, active pike will have to eat more as their calorie consumption is higher. That is another reason why these pike are easier for us to catch.

With an ambushing predator, things look different. It does not chase after every prey. It leverages its hiding spot and camouflage. The preferred attack strategy is the ambush. It remains motionless in its hiding spot for many minutes, waiting for the right prey and moment. Therefore, we have to get our bait as close as possible in front of the pike—make it enticing. The ambushing pike must see it as an easy prey. Let the bait rest from time to time as you reel it in.

The good thing is that the ambushing pike stays in one spot. To reach this spot with our bait, we should not approach without a plan. If you just cast your bait randomly, you will most certainly miss the motionless predator. That is more of a strategy for an active pike. We cannot tempt the ambushing predator from its hiding spot with random casts.

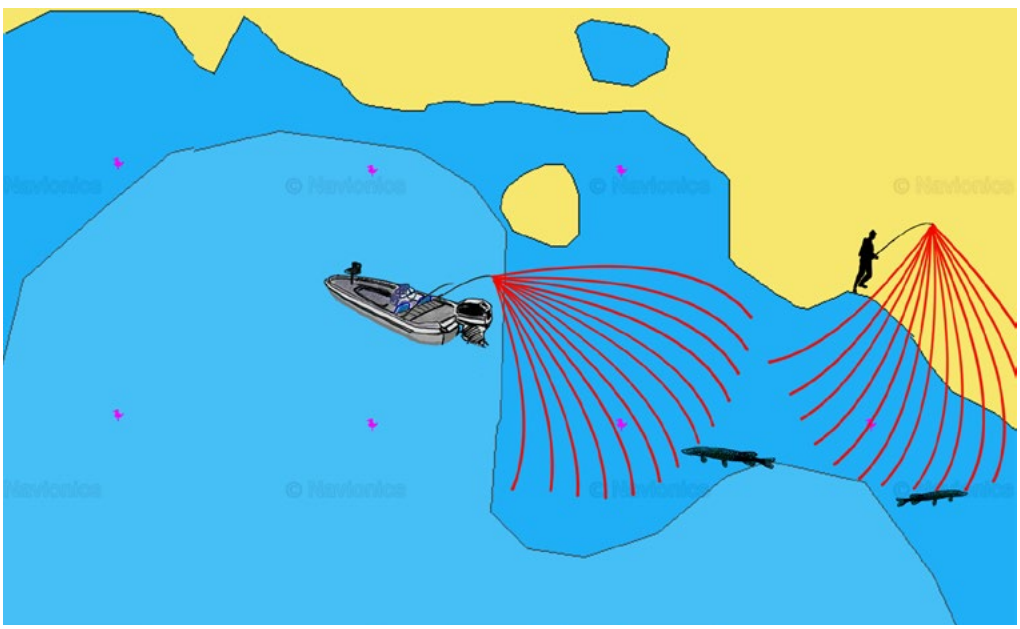


Figure 3.3—Ambushing predators - Strategic fishing of a hotspot

Our best chance to hook this elusive predator is to strategically fish the area. You start to cast at twelve o'clock and work your way clockwise, cast after cast. Since we do not know how deep the predator is staying, it is not easy to pick the right bait. Our knowledge of the pike, which we expand on bit by bit throughout this book, must guide our decision.

Remember

Fishing for active pike is easier, as their lifestyle causes them to cross paths with our baits more frequently. However, these pike make up only a small portion of the overall population. Fishing for lurking predators is a lot more complicated. For these, we have to adjust our fishing strategy. Lurking pike often hide between branches, trees, and water plants. For this kind of fishing, we need baits that do not easily get tangled up—move the bait with care. Fishing this way is a little more challenging but will result in more strikes. After all, if you stalk lurking pike with lots of casts, eventually you will also hook an active hungry one.

3.3 The pike and its prey

3.3.1 Hunger and feeding

The pike's hunger seems to know no bounds. From what one hears and reads, the pike appears to be one of the most voracious predators in our waters. Many of us have seen the videos in which pike hold large prey in their mouths. Are these pictures true to reality? How voracious really is the pike?

Animals differ in their habits, when and how they eat. For example, almost all owls eat at night. Other animals eat less regularly and spread over the day. We shall learn about the pike's feeding habits in this and other chapters.

We can subdivide living beings more or less into two groups based on their feeding habits. The first group digests while eating. The second group eats, digests and eats again after digestion. As a predator, the pike belongs to the second group. Essentially, a hungry fish is more likely to strike our baits than a well-fed one. However, that alone does not guarantee success.

Various factors influence the feeding behavior of the pike. On the one hand, the pure necessity of feeding dictates behavior, on the other, factors such as the availability of the prey and the prey species play a role. What is also important is how the pike prefers to feed. The presence of other pike can have a great influence as well.

Last but not least, aspects such as temperature, oxygen, wind, weather, and more, decide when the pike will hunt. In the end, the personality or instincts of the individual pike will trigger the hunt. At this moment, it is necessary to be with the right bait in the right spot.

The findings in the next chapters may help us to better assess the likelihood of a pike

strike at different times of the day and year. Is it true that pike do not roam the waters on slow days? Are our baits to blame? Or are they just not hungry? We are curious to see what the following chapters will reveal.

To study the daily feeding patterns of pike, researchers catch them with the aid of electric fishing—sometimes the pike are also caught by traditional methods, either by rod or ned. Researchers then investigated the stomach contents of the fish. That helped to draw conclusions about the amount and prey species fed, the duration of digestion and the calories obtained.

3.3.2 Digestion of the prey

We are displaying the digestion process of a prey in this graph. Leading up to point one is the hunt. Afterward, the pike digests. Only at time interval 9-10 does it start to hunt again. The time intervals do not represent exact time data, instead, help to sketch out the process. The hunger of the pike does not kick in instantly after the digestion of the prey. It takes a while for the pike to go on another hunt—time interval 7-9. Many catches of pike with an empty stomach also prove this.

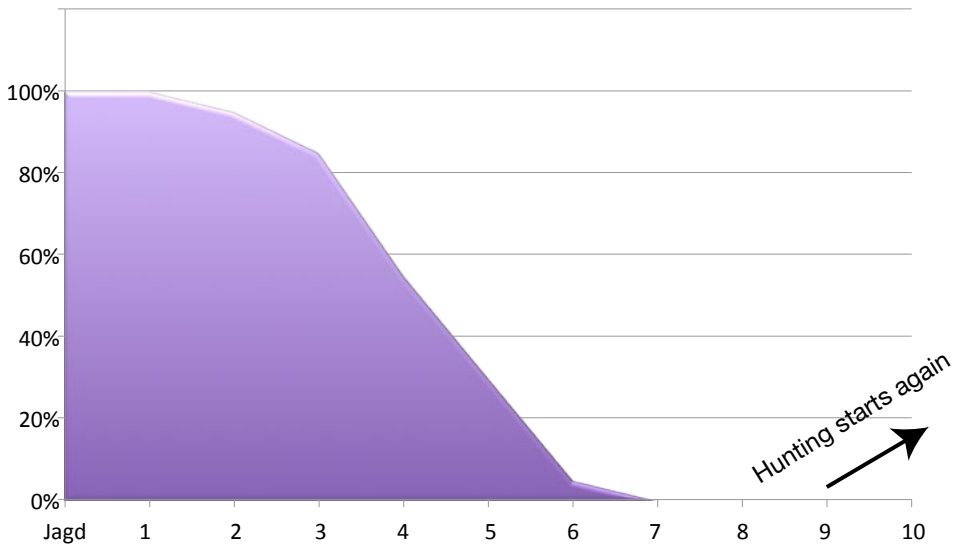


Figure 3.4—What percentage of the prey remains undigested?

We can see that time passes between the end of digestion and the start of a new hunt. Once the stomach is empty, the pike may not initiate a new hunt instantly. Likely, it will go on the lookout for the next ideal opportunity, first—it may also not be hungry again just yet. All this alone does not help improve our fishing as the time scale (1-10) is still ambiguous. The following chapters will shed light on this matter.

How long does the pike take from 1-10, how much time passes between two hunts?

How often pike hunt depends on two factors. First, it must feel hungry. The hunger starts again sometime after digestion. Second, both prey and hunting opportunity must present themselves. That sounds banal but is essential. Depending on the time and water, food may not be available. So let us turn to a few facts and figures from various studies. We only looked at the months for which several results are available.

Number of pike caught and fish in their stomach per month

	Mai	Juni	Juli	Aug.	Sept.	Okt.	Jan.	März
Number of pike caught	181	248	156	272	223	271	140	218
Number of pike with empty stomach in %	48 %	40 %	63 %	41 %	35 %	31 %	48 %	45 %
Number of fish in the stomach	1–2	2–3	1–2	1–2	3–4	5–6	1–2	2–3

We can read various things from the table. Pike do not seem to eat regularly. There are times when pike eat less, which is evident from a high proportion of empty stomachs. At other times, pike fill up to the seams. Then, the proportion of empty stomachs is lower.

We marked the outliers in color. We see that every month some of the pike had an empty stomach, meaning researchers caught them after the end of digestion and before renewed hunting success. It is noteworthy that in September and even more so in October the number of pike with an empty stomach was very low. The pike must have eaten a lot more during those months. Conversely, in July, the proportion of empty stomachs was quite high.

3.3.3 How many fish does the pike feed?

If we compare the average number of fish found per stomach, it becomes clear why. In June, researchers found an average of two fish per stomach, in October that number was five. The pike must have head a real feast. These findings support the prevailing knowledge that autumn is a great month for pike fishing.

Most pike are not as greedy as you might think. Of course, we could assume that the results are not reliable because researchers might have caught some of the pike before they had a chance to catch more prey. However, researchers conducted the study over a span of several years and obtained a large sample size, so we can mostly rule out that assumption. Okay, so according to the table, the pike only feeds once or twice in most months.

According to our understanding and from what one has heard and read, one to two meals does not constitute a voracious predator. In comparison to the zander, which sometimes catch 5-15 over a short time span, that number is frighteningly little. However, we have not talked about the size of the prey yet. Likely, the prey size will turn out

much smaller for the zander.

Nevertheless, that number shocks us, especially as it applies to large pike as well. The question arises: „Once the pike has digested its meal, how long does it take for it to get hungry again?“

3.3.4 How much time passes between meals?

Pike eat when they need energy and hunger sets in. They do not eat every day nor do they have to eat every day. The following table shows the average duration between meals.

Number of days between meals

	Time between meals (days)
Spring	2–3
Summer	2–5
Autumn	1–2
Winter	10–40

At first sight, the gap between the meals is frustrating from our point of view. Up to now, we have assumed that the pike are biting every day and that we only have to catch the right time of day. However, reality seems to differ. If pike only feed every 2-5 days, does this imply that we need a lot of luck to catch a hungry one? After all, we are on the lake only occasionally, most of the time on weekends.

The winter months seem to be even worse. Supposedly, at times pike go without feeding for 10-40 days. Who can catch pike like that and? And how are the pike able to go without food for that long? Let‘s shelve these question for now. We will come up with the answers in later chapters.

Nevertheless, with these numbers, we ought to seriously question our hobby. Well, at least some good comes from all this: Now, if we come home empty-handed, we got a plausible excuse for the rest of the family.

Remember

If we objectively look at these numbers, we can see that the pike does not deserve its title as a voracious predator. On the contrary, it is a very efficient feed converter. It manages to convert between 80-95% of its prey to energy. It only excretes the pitiful leftovers. Also, there is a big difference between the sexes when it comes to feeding behavior. The females have a very high energy requirement due to their early egg development in summer and eat 1.5-2.5 times as much as the males. That is probably the reason why we generally hook more females than males.

How do the researchers detect the number of days that lie between meals?

Amongst other things, by inspecting the stomachs of the fish, allowing them to draw conclusions about the digestion. Most of the times, the contents of the stomachs looked very different, depending on the duration that had passed since the catch. If some prey fish have the same digestive symptoms, one can assume that the pike caught them at about the same time. So, if the pike hunt more than one prey fish, this likely happens at shorter intervals. Once the pike are well-fed, the intervals get bigger (see table). The time period can last from several minutes to hours, even days. How often a pike feeds depends on the situation and hunger of the individual pike.

Remember

For us, this means that we have to wait a bit as the pike are probably not hungry and greedy all day long. We can increase our chance of success in the summer by fishing the same spot on two consecutive days.

Rest periods

In the period between the hunts, the pike does not move much. In general, the resting phase makes up about 70-80% of the total time, whereby it differs from pike to pike. Remember chapter 3.2.2 „Ambush attack or active predator?“ on page 27. The longer the rest periods, the fewer calories the pike burns, making it more efficient at consuming the obtained energy. Its activity does not increase again until a new hunt or a change of territory. The opposite applies for the more active predators. These pike move often, which increases their calorie consumption. Therefore, they must eat more which increases their energy requirements even further. So when we talk about average values, we should always keep these two types of pike in mind. The individual numbers for each pike can differ quite a lot from the average.

Speaking of calories: In summer, pike require between 20-35 kcal per day for each pound (9-15 kcal per day for each kilogram) of body weight, or between 20-30 kcal per meal. If we speak of a 30“ (75cm) male pike weighing 8lbs (3.5kg), it must feed between 70-105 kcal per meal.

To put this in perspective for us anglers: A one-year-old 2.5“ (6cm) long perch provides about 20 kcal. If the perch is three years old with a length of about 5“ (13cm), it provides about 80 kcal. Two two-year-old perches provide about 35 kcal each. These values match the number of fish discovered in the stomachs of the pike.

“In summer, pike, depending on their size, eat one to three fish every 2-5 days.”

In winter, these values decline to an unbelievable level. The metabolism of pike slows down. Theoretically, pike only require between 1-3 kcal per day for each pound (0.3-1 kcal per day for each kilogram) of body weight then. In reality, of course, pike do not

start to restrict their meals to half a fish, but the distance between meals increases.

For comparison, a piece of chocolate contains approximately 34 kcal. For winter meals, a piece of chocolate would be enough for the pike—or rather 1-2 2.5“ (6cm) long perches. And depending on the water temperature, meals can be 9-40 days apart. Unbelievable!

„In winter, pike eat 1-2 fish every 10-40 days, depending on their size.“

Remember

This chapter will probably cause very different reactions from reader to reader. Some will say that pike are an epidemic, biting on every fishing trip, while others will have finally discovered the reason why they go home empty-handed so often. Please, always look at the results with some perspective. The sample size of this and other studies is too large to label the results as nonsense. After all, we are talking about different studies that go back half a century.

We have to accept that pike are not as voracious as was previously assumed, at least not on average. 80% of the pike population digest about two prey fish at any one time. 20% hunt more fish, grow faster, and their instinct tell them to outperform their peers. These pike will unquestionably live up to the myths of the voracious predator. They will feed more, be more aggressive and catch easy prey wherever they can. That is the reason why a small portion of the pike are absolute monsters.

If in autumn the average number of prey fish in the pike‘s stomach rises to over five, this corresponds to the general state of knowledge. At mid-latitudes, October is known as the best month for pike fishing. In this month, too, the 20% voracious pike will probably feed more than their conspecifics.

„The pike must catch more prey at higher water temperatures.“

On the one hand, this is due to the increased metabolism. However, the pike must also adapt their activity level to the warmer water. That means that fishing for pike is not as easy in cold water as in summer. During Winter, you must adjust your bait presentation and hotspot selection. Celebrate a Winter catch! Because either you got lucky or displayed incredible skill and endurance.

„The best months for pike fishing are before and after spawning—early summer, and autumn. Females eat more than males in summer and winter“.

Let‘s take a short break and have a look at what we can incorporate into our fishing.

Changing the location while pike fishing is essential. It is recommended to change location after 20-30 minutes of unsuccessful fishing. Do we have to question that? Hm... in the face of the facts, you can look at it one way or the other. Either you change the spot, assuming there are no hungry pike around, or you do not move, hoping to catch the short feeding period. We should all question the statement that anglers

should change location after 20-30 minutes of unsuccessful fishing. In our opinion, most anglers change spots too quickly because they are impatient.

„Concentration and patience point the way.“

Personally, we are no better and are often torn between moving and staying when the pike are not biting. For the next season, we have promised ourselves to change location less frequently. Hopefully, this will bring more success than last season. At least it is a little reassuring to know that it might not be our technique but the feeding habits of pike that are causing the slow days—it is nice to have found the culprit ;) For better or for worse, we will have to accept the possibility of long, unsuccessful periods of pike fishing. Let‘s get used to it. For hours and hours, we will have to cast our bait. Yes, the pike will be there. However, there is a good chance that they will not be hungry.

3.3.5 3.3.5 The pike’s growth

Although pike grow at different rates, compared to many other fish, they grow faster and can reach the 20“ (50cm) mark within the first year. Of course, that is only a few of them. Pike not only grow fast but can also reach an impressive size. Anglers catch pike beyond the 3-foot (1-meter) mark relatively often. Some are over 50“ (130cm) in length. Pike can grow old, too. A bit less than half the pike populations are older than six or seven years. Few of them are older than 12 years. Under good conditions, some pike can even reach an age of over 20 years—we are usually talking about females here. They often grow faster than their male counterparts and thus reach bigger lengths.

If we look at the course of a year, it quickly becomes apparent why this is so. If we start our observation after the salmon season in April/May, all pike, no matter which sex, grow rapidly in the months after spawning. They feed far into the summer. While the development of the females fluctuates between normal to fast up until the next spawning season, the same cannot be said about the males.

In summer, the growth rate of the males decreases very rapidly. Yes, they even lose weight during this time, sometimes more than 10%. It is not until September that the males start feeding heavily again to grow until the next spawning season. They then gain up to a quarter of their weight. We can derive very nice fishing periods from these findings—growth implies that the pike are consuming more energy than they need.

Growth rates of pike

	after spawning	early summer	Midsummer	Autumn / Winter	spawning period
female pike	fast growth	fast growth	normal growth	normal growth	little growth
male pike	fast growth	normal growth	Weight loss	fast growth	little growth

Pike growth and fertility depend heavily on prey availability. Usually, adult pike gain

2-3.5 lbs (1-1.5kg) per year in weight. If the prey stock is excellent, the weight gain is all the higher. There are also big differences between individual pike. Particularly in the head area of the pike, some bones can grow very quickly. If there is much prey or if a pike has specialized in larger prey, its head will grow faster than that of many of its peers. Compared to its body, the head looks then like a giant skull—we all have seen the pictures of pike with huge mouths. Some anglers mistakenly have concluded that there are two types of pike in their waters, one with a slender shape and one with this giant skull.

Figure 3.5—Pike with giant skull - Photo: Edmond Prey, Guide at Pronature-MV.de

In the years in which the prey stock is lower because of strong winters or other external influences—pollution or algae plagues, pike growth slows down accordingly.

In waters where there is generally less prey, pike growth is also slower. These include some nutrient-poor oligotrophic waters. Although they are species-rich, they generally have a smaller fish population than meso- or eutrophic waters. The temperature of a water body also influences species diversity. Warmer water bodies have larger fish populations than cooler ones.

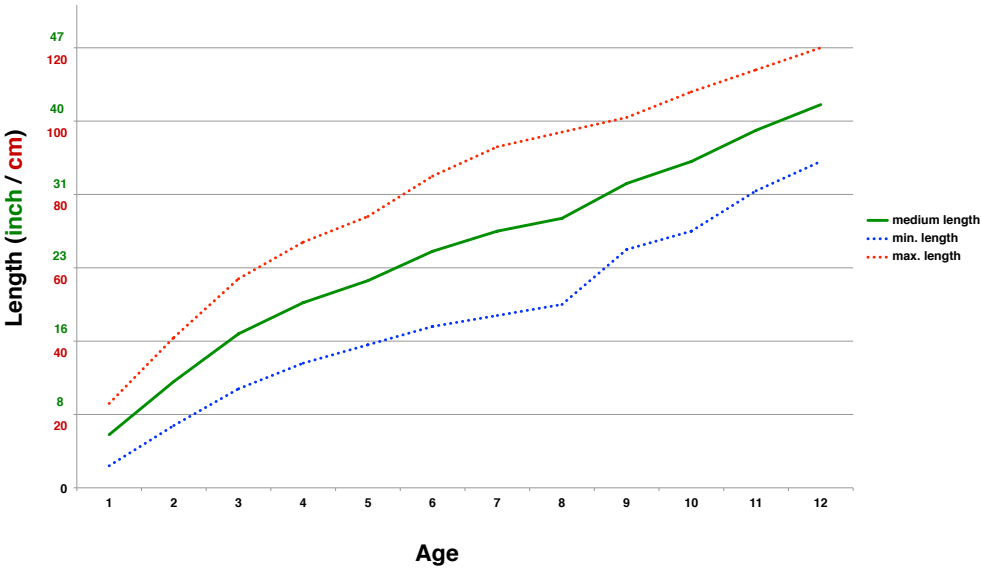


Figure 3.6—Length of pike as a function of age

Differences in growth

Pike in stagnant waters are often larger than pike in flowing waters. There are also differences in growth depending on latitude. Pike populations have spread between the 40th and 52nd northern latitudes. The growing season begins after spawning in spring and slows down towards winter. The duration of this period varies. While spring arrives in Germany in March/April, in Finland it does not come until June/July. Cold temperatures slow down growth once more. In Finland, it gets colder much earlier than in Germany or France, for example. The growth period per year lasts longer in Central Europe compared to Northern Europe. A comparison of one-year-old pike illustrates this. Far to the north, the pike reach a length of approximately 10“ (25cm), while in Central Europe they grow up to 15“ (40cm). After seven years the Central European pike crack the 30“ (75cm) mark. In the north, that can take up to 20 years. However, rapid growth also has a downside. The pike that grow faster often live shorter than their slow-developing counterparts.

Environmental factors influence the development and size of the pike, too. They have a decisive impact on the prey and hunting conditions.

3.4 The prey

How to describe the prey of the pike? The pike is not a very picky eater. On the contrary, it eats all kinds of fish including its own species, but also birds, snakes, rats, invertebrates like crabs, snails, and beetles. The pike can quickly adapt to whatever its environment offers. There is plenty of evidence for this.

For example, pike in Loch Lomond, Scotland, completely changed their preference from vendace to ruffe within one year of the ruffle first being introduced in the water. In the following years, pike no longer showed much interest in the vendace. Those who

missed this circumstance and stayed with the previously successful vendace baits probably had considerably fewer pike strikes in the following years.

Does the pike specialize in certain prey? Yes and no. Although the pike is a predator that targets a variety of fish, its food is proven to consist largely of one or two species. The specific preference differs depending on the water. So while in one water body the roach bait brings a lot of excitement, it might be the cause for many slow days on neighboring waters. What is that saying? „What the farmer doesn‘t know, he doesn‘t eat.“

Specializing in one particular prey has a simple reason. Pike know how to hunt them best. Each prey behaves differently, and the predators must adapt to their movements and reactions. For this reason, it is important that we, too, develop an understanding of the prey‘s behavior. After all, we all know that one person who worships a specific bait based on past successes, marketing it to others at every opportunity, often without being asked for input. Don‘t be that person.

Although the fishing community interacts in a complex system, certain things are quite simple. When the roach is the prime target for pike, a bait in its style will be all the hype. If not, then we should imitate another prey.

Which prey the pike choose depends on many circumstances. For one, availability plays a significant role. The species and population sizes differ between waters and may even vary from year to year. Which species have settled depends on the structure, the nutrient content, and the geographical location. Fish that are common in southern latitudes may not occur in central or northern Europe. In America and Canada, over millions of year, entirely different species have developed. In those waters, fathead minnows and bluegills are important prey for pike. Roach, crucian carp, perch, bream, and other whitefish are common in Europe.

In the following chapter, we have compiled how different prey and pike behave towards each other. With this knowledge, you should be able to improve your bait selection and bait presentation.

3.4.1 Background Knowledge - The prey‘s defense

We can distinguish the prey of the pike according to their behavior and defense strategies in the presence of a predator. Across millions of years, every fish species has developed unique survival strategies. The coexistence of prey and predator is complex and varies due to many external influences.

The following information comes from various records, studies, and experiments. They illustrate this complex relationship between predator and prey and show basic behavior patterns of the different species. The emphasis is on the word „basic behavior patterns.“ In the wild, context and environment affect the interaction between predator and prey.

As far as we can differentiate and substantiate this, we distinguish between an environment with and without vegetation and an environment with many soil structures, such as edges, crevices or holes.

Such information is fundamental for us to select the right baits and to place them at the appropriate depth or location. Each bait mimics a prey, and we must present it to the pike accordingly. The better we can imitate the natural movement of the prey, the better our chances to hook a cautious pike. The following behavioral patterns provide a first insight into the complex behavior of prey, enabling us to optimize our bait selection and presentation.

Schooling is the ultimate protection against predators for almost all whitefish. Schools of bait confuse the predator and make it more difficult for it to single out individual fish. If a predator seeks to divide a school of bait with a targeted attack, the individual fish will try to regroup immediately. However, species differ in their success with this strategy. A fish that does not rejoin the school of bait after an attack likely will end up as prey.

Schools of bait escape either upwards or downwards—sometimes they attempt to get behind the predator. This defense strategy requires a lot of free space. Amongst dense vegetation, the formation of the school of bait is more difficult, causing fish to become easy prey.

A second successful defense strategy is camouflage—the fish are well adapted to their environment and become blurred with their surroundings. The different patterns of the perch make a great example. If perch live near the overgrown shores, they have more pronounced stripes than their conspecifics in open water. It is important to mention that perch live on their own. Their escape is usually not coordinated with other fish. However, they demand a lot of cognitive load of the pike, making targeted evasive maneuvers around edges, corners, and obstacles. These obstacles serve as visual protection. Often, the fish then remain motionless very close to the stones, edges or obstacles.

A third defensive option is to make a quick escape. If a prey takes off quickly, the predator will not stand a chance. In order to spot the predator early, the view must be unobstructed. The water should be clear and the prey must have good eyes.

3.4.2 Roaches

Roaches are the preferred prey for pike in many waters. It seems that the pike has adapted its hunting strategy very well to this species. The roach prefers to stay in shores with well-developed vegetation. However, we can also spot it in areas with little vegetation.

Irrespective of structure:

Before we get more specific, we should note a few common features that apply to most roaches. Roaches have a slim build, which gives them speed. They flee quickly when a predator gets too close. Records have shown that roach can accelerate at 6.5 ft/s (2 m/s). That is quite the speed. It is hard to imagine how the much larger pike manages to accelerate its thick body to catch up.

A bubbling surface

Roaches often form schools to protect themselves from attacks. Near the shore area, they tend to flee towards the surface. If a predator attacks the school of bait directly, it splits into two parts and immediately reunites behind the predator. The renewed school of bait formation is so good that only very few fish are isolated. Pike lack the element of surprise for the next attack. However, depending on the situation, some pike will launch a second attack.

The water surface magically attracts the roaches in case of danger. Some of them swim directly on the waterline of the surface. We do not know exactly why. Researchers assume that the perches can swim quicker if part of their body is out of the water. Another theory is that predators avoid hunting near the surface to not end up as prey for birds or other animals.

If no other escape-possibility remains, the roach jump out of the water. Different experiments have confirmed that roaches can perform several successive jumps. It is noteworthy to mention that roaches only jumped in the presence of a predator.

Remember

So, if we are on the water and see roaches jumping, we can assume with a very high likelihood that:

1. a predator is right underneath
2. a predator is hunting

That is what we have been waiting for. There is hardly a better indicator of a great fishing day. When we witness this behavior on the water surface, we have to be fast. It is the right time and the right place to cast out bait. The predator—sometimes multiple—are close to the surface and biting. Our bait should imitate whitefish and be kept shallow.

How much time do we have?

Not a lot. Remember, pike only hunt 1-3 prey fish before they stop feeding. However, that will require several attacks as not each attack is successful. We probably have a few minutes till the end of the hunt. As long as the surface is bubbling, we have time.

The pike does not chase roaches for long. Roaches have much better stamina. According to the motto „Either, I get lucky or not," it leaps at a single roach or a school of bait. An individual pike attack last only a few seconds—single-digit range. That is astounding when we consider that the pike actively pursues other prey species for up to 1.5 minutes leading up to the final attack.

When dusk sets in

Depending on the season, when dusk sets in, a large proportion of the roaches leave

the safe banks in large schools of bait. Especially if the shore areas are not very pronounced and offer little food, other food sources are sought. The darkness limits visual predators such as the pike. Many roaches use this opportunity to fill their stomachs in open water, for example with zooplankton, small crabs and more. Accordingly, this is a perfect opportunity for the pike to catch prey. They wait for the migrating shoals to start their hunt. Before daybreak, the shoals return to the protecting shores.

Presenting the roach bait

Figure 3.7—Roach bait SPRO Iris „The Boss“

The shore area varies greatly between waters. Predators and prey adapt to these different habitats with various hunting and defensive behaviors.

Hunting when vegetation is present: Most roaches spend time in or slightly above the vegetation. When a predator approaches, they surface within seconds. The pike specializes in hunting from the vegetation. The more vegetation there is, the more likely it is to launch an ambush. The pike waits motionless in the thicket for the right moment. To attack, it rushes from its hiding spot towards the surface into the swarm of roaches.

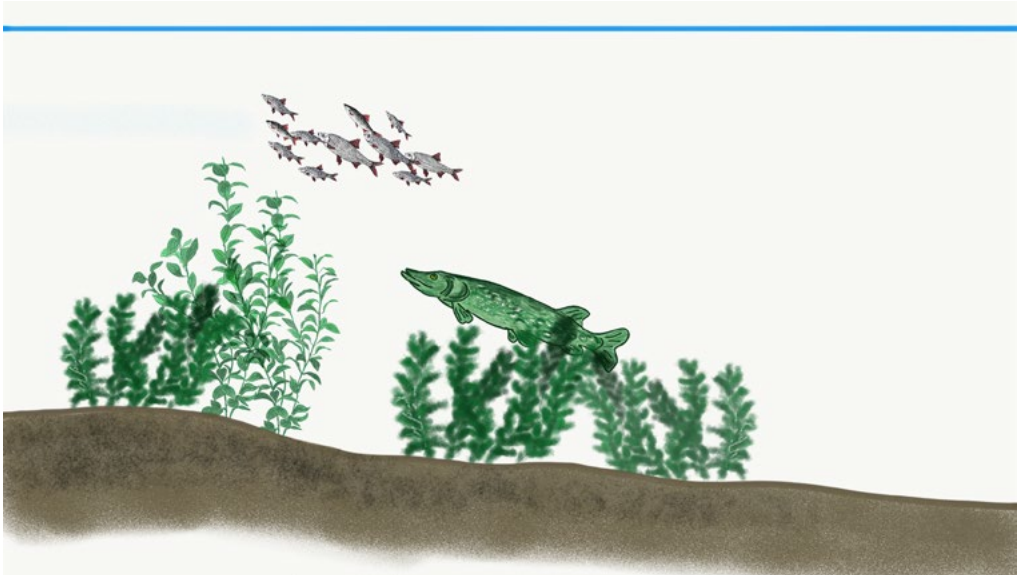


Figure 3.8—Pike from cover

Even as some roaches seek protection in the thicket of the vegetation, their instincts tell them: „form a swarm.“ The roaches within the vegetation play a subordinate role for the pike. The probability of false attacks between plants is too high, risking a waste of energy. If the hunt takes place within the vegetation, it can sometimes last several minutes—the pike hopes to avoid this. Roaches are almost inaccessible in vegetation because they disappear quickly among the plants.

We do not know why roaches prefer the surface area over the vegetation as their escape route. The latter seems more promising. In general, we know that pike prefer other species when hunting in the vegetation.

Bait selection and movement

Roaches are very agile, so only if the distance between predator and prey is close, will the pike hunt roach in vegetation. The pike uses the vegetation as cover and waits for the best opportunity. It waits until the distance is no more than 6-8“ (15-20cm). Wow, so close? Yes, because more or less dense vegetation offers the roach many hiding spots and hinders the pike in its attack. In an instant, they disappear between the individual plants.

We conclude that it is better to use another bait than the roach bait if you are casting it directly into the vegetation. In any case, you have to cast it right in front of the pike‘s nose in order to attract it. Be careful to not accidentally get hooked!

In case the vegetation is not very thick, roach baits with retainers are very useful. If placed correctly in front of the pike, they present a good opportunity for easy prey. Therefore, place the bait very close to the pike. Pike usually run a „cost-benefit analysis“ prior to an attack. That means that we have to be very patient.

For the placement of a dead roach as baitfish we can draw the following conclusion: Ensure that the bait floats in an area with no vegetation. The roach should appear to the pike as easy prey. However, if you are fishing on the bottom, this should not matter, as the bait will be considered carrion.

If vegetation is present, the roaches like to stay in the open water above it. So, you should have a good chance to catch a pike if you present your roach bait slightly above the underwater vegetation. Wobblers run flat, and we can place them beautifully between the vegetation and the surface as well. Crank- and Jerkbaits usually run very flat, too, and imitate a fleeing prey very well. That should trigger one or the other strike.

Hunting without vegetation, but with soil structures: Away from any vegetation, edges and stony structures present great opportunities for pike to fill their bellies with roaches. The prey fish now lack cover. They prefer the water surface instead of the jagged bottom as an escape route. The swarm strategy is their only defense. If the pike manages to isolate single prey fish with a fast attack, it is almost certain to win.

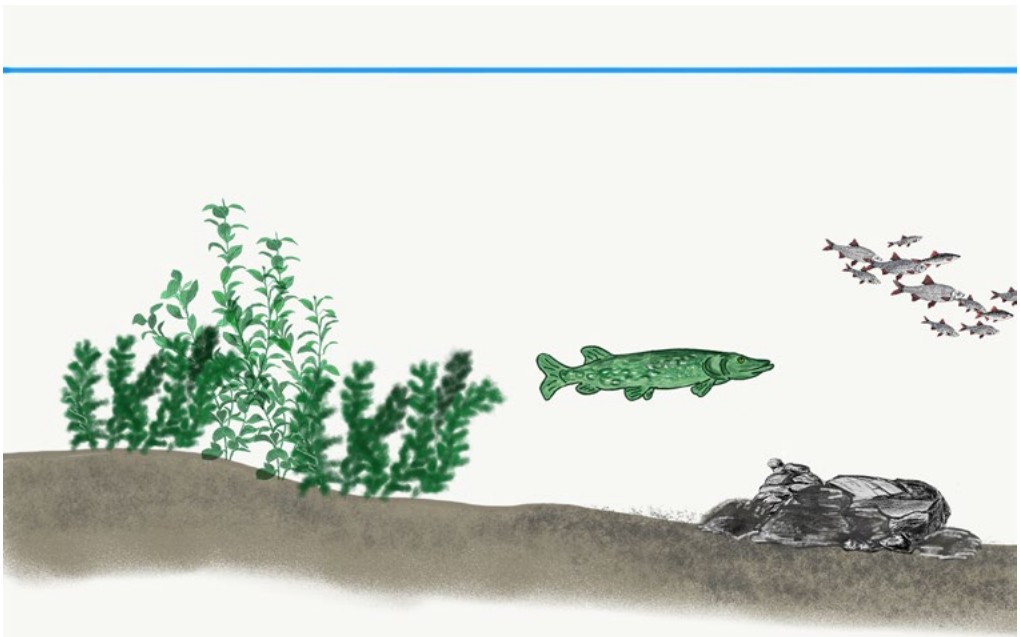


Figure 3.9—Roaches away from vegetation - rugged soil

A stony and angular bottom is more frequent in mountainous heights than on flat land. a fish finder makes it easy to map out a hard surface. Roach schools rarely seek protection at the bottom of these structures, relying exclusively on the swarm strategy instead. The question remains: „To what extent can we extrapolate this observed behavior to other obstacles on the bottom?“

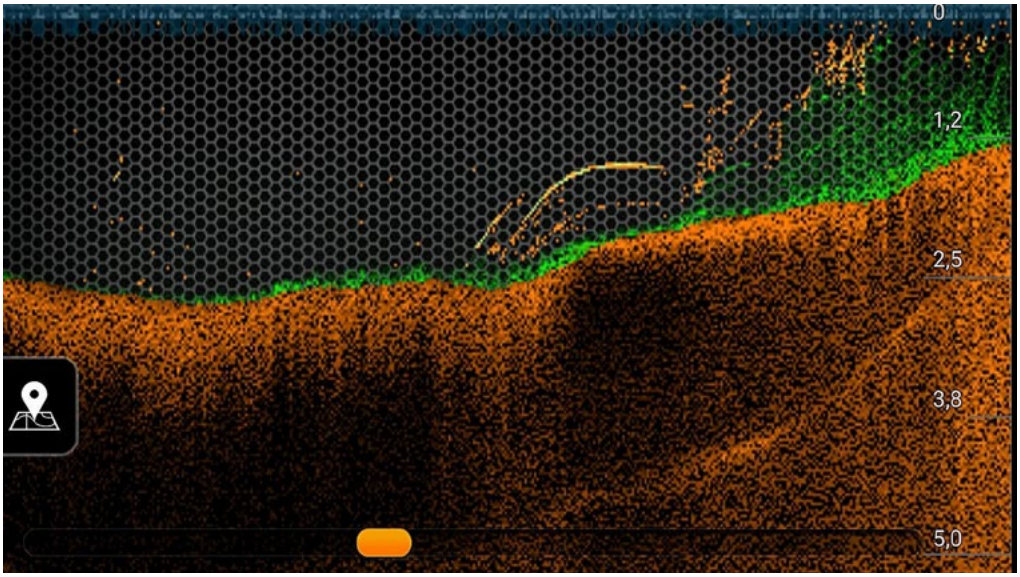


Figure 3.10—Deeper: Solid bottom

The bottom line of a 2D fish finder is mostly straight and does not display any obstacles. The double bottom line indicates that the ground is solid. This representation results from the way a fish finder works. Knowing how to interpret the output of a fish finder is essential to discovering hotspots successfully. You can learn more about this in the our Book „The Ultimate Fish Finder Guide“ (Chapter 4.2.1).

Bait selection and movement

Our roach baits should reach the different layers of the water column so that we can present the bait to pike at deeper depths as well. That signals to the pike that it can make easy prey. You can either use wobblers for different depths or rubber fish. When using lead, make sure that you reach deeper water layers quickly, but not too quickly. After all, it is not necessary to touch the bottom.

Hunting in open water: In open water, the swarm strategy is the most effective means of defense. The pike can attack a swarm in such a way that it does not get confused. In murky waters, it has better chances than in clear waters. A successful attack should last no longer than a few seconds, at most a few minutes. Of course, that does not mean that the first attack will be a success.

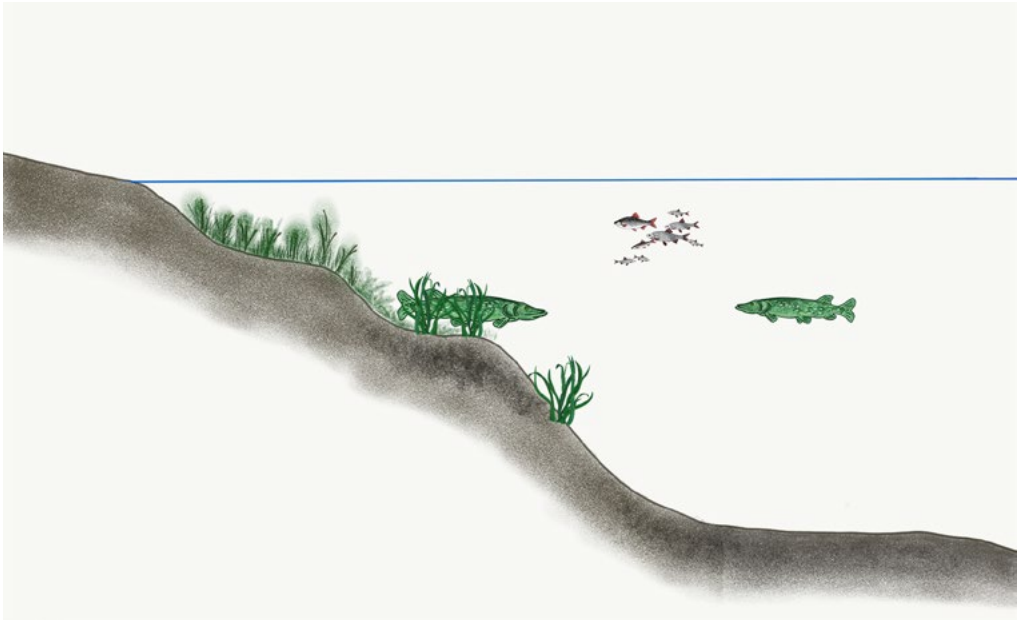


Figure 3.11—Roaches in the open water

In open water, the factor of visibility plays an important role. Here is some general wisdom: „Multiple roaches see more than a single roach.“ If the water body affords good visibility, the pike will likely wait for darkness. Without a cover, the roaches can spot the predator very early and flee. At dusk or in murky water, the leaf turns. Now, the pike is perfectly camouflaged, and its odds of success have increased considerably.

Without vegetation, perches use a larger spectrum of the water column and no longer necessarily stay close to the surface. Near the edges of the open water, they like to remain in mid-water.

Bait selection and movement

It is relatively easy to present roach baits in vegetation-free areas or at the edges towards the open water. Larger pike, in particular, choose a location away from the vegetation, towards the sharp drop-off that runs towards the open water. Depending on where we offer the bait, we should consider the depth. Wobblers with shovels can stay at a fixed depth at the edge or in the open water. Rubber fish allow for more flexibility.

The speed of a pike attack

Pike hunt roaches almost always with quick and short attacks. The distance to the prey plays a significant role for the pike. The pike does not only locate its prey with its eyes, but also with its lateral line. It uses all its senses to prepare an attack. The distance to the prey plays a key role in this regard. We have to ask ourselves: „How close to the pike must we present our bait?“

Let‘s compare the probabilities of a pike attack on roaches. If you round, 3ft (1m) appears to be the magic mark.

Pike attack roaches up to 3 feet (one meter) away. The closer the prey, the likelier an attack. If the roach is more than 3 feet (a meter) away, the probability of attack reduces by 50%.

To put it another way: If we manage to place our roach bait as close as possible to the pike, we increase the probability of a pike attack considerably.

Or to put it yet another way: Be strategic in casting your roach bait to get it as close as possible to the mouth of the pike. (see Figure 3.3, „Ambushing predators - Strategic fishing of a hotspot“ on page 28)

If we fish in deeper waters, be sure that your bait reaches the deeper water layers. Your best bet is to employ a fish finder from the boat or a „Deeper“ from the shore. That way we can see the big fish crescents at their respective depths.

Figure 3.12—Fish finder image of Deeper

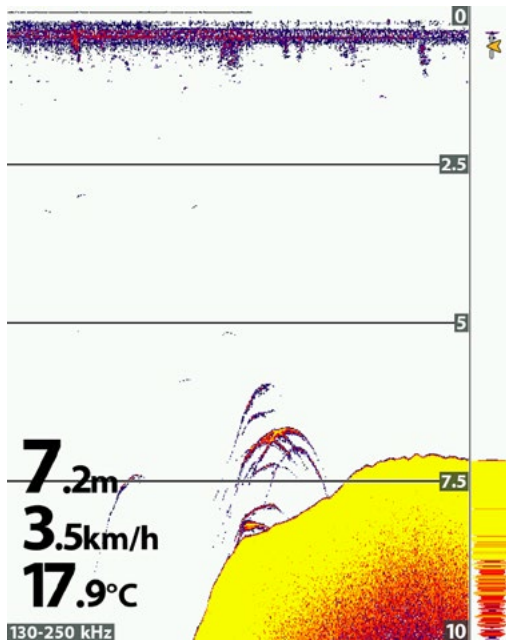


Figure 3.13—Fish finder image of Humminbird

Remember

The roach is one of the pike‘s favorite preys, but not in every environment. Roaches stay near vegetation and in the open water above. We have discovered that roaches like to seek refuge in the upper third of the water column or near the surface. If we present our bait here, it should appear natural to the pike.

As pike seem to pursue roaches for only a short time, we have to get close to the pike with our bait to lure it out of its reserve. In concrete terms, this means that we must stay at a hotspot for a long time so that we can plow through the water inch by inch (centimeter by centimeter). One advantage is obvious. If you stay longer in the same spot, you will save time and increase your odds of catching the bite time.

3.4.3 Salmonids

Salmonids seem to magically attract pike. In Keret, a river in Russia, the pike ate almost all freshly introduced salmonids. In Ireland, where pike settled hundreds of years ago, pike must first be removed from waters before a salmonid population can develop. The same applies to English waters.

However, this passion for salmonids is mainly found in pike with a length up to 30“ (75cm). Larger pike seem to lose their appetite for trout. Why that is the case, we can only guess. However, we know that once trout reach a healthy size, the risk of being hunted decreases considerably.

At the time of this writing, further information on trout is not available. If you have additional questions, please send us an email or leave a comment on the book‘s product page.

Remember

A few anglers hail large trout as the ultimate pike bait. We cannot support nor deny this statement at this point. However, we know that trout beyond 8“ (20cm) in length—often 12“ (30cm)—are too big a chunk for most pike. If the preference of pike for trout holds true, a trout bait is probably worth gold. However, we know with certainty that not all pike have a preference for trout. Most waters in the lowlands do not house salmonids, so the pike living there have never crossed paths with a trout.

We must adjust the choice of bait to the water. The reason is simple: The pike instinctively wants or has to hunt easy prey. So the question remains, how can it effectively attack a prey which it does not know? Yes, you can catch pike with trout baits in any water. However, you will have far more success imitating the local prey—by the way, this selective approach is a lot easier on the wallet, too.

3.4.4 Cannibalism or the pike as prey

Cannibalism is very common among pike. Everyone has seen the pictures of intertwined pike mouths and bodies. Cannibalism is in the pike's genes. This behavior develops very early and never stops. The extent of cannibalism differs from water to water and from year to year. But how pronounced is cannibalism and are there indications for when it occurs? The answers to these questions contain great implications for those contexts in which we choose to try the pike bait.

Researchers have studied cannibalism among pike through many experiments. These experiments took place in tanks, aquariums or in small closed ponds. Depending on the experiment, the pike were either small or large. The scientists hoped to study what happens when prey fish are absent for a longer period of time. After a while, researchers introduced additional pike, either smaller or of the same size. The objective was to answer the following questions: When does cannibalism occur? How frequently? How do pike react to smaller or larger conspecifics?

Results

Multiple experiments produced interesting results. The survival of the pike depends very much on the available vegetation and the population size of adult pike. If too many pike inhabit the same environment, the environment regulates itself with the larger pike eating the small ones—their own survival depends on a decrease in the population. Smaller pike are now more likely to fall victim to their larger conspecifics. Cannibalism may increase only in some areas of a water body, while other spots remain unaffected.

The population limit can be reached very early when the pike are still small. Good climatic conditions can literally lead to a pike explosion within a few years. Then, the smaller pike, which hatched late in May, are hunted and eaten by their larger and earlier hatched conspecifics. Optimal living conditions at the beginning of spring can accelerate this process. This situation occurs, for example, when a cold period after the pike spawning season delays the spawning of prey fish species. Then there is not enough food available for the fast-growing pike. The eggs or freshly hatched fish are still too small.

The ratio of available spots to the pike population size within a territory also regulates the extent to which cannibalism occurs. If areas with overhanging shore zones and abundant vegetation are scarce, pike are forced to be more active in their hunt for prey—they run into each other more often. These meetings can lead to conflicts and may end in cannibalism. By the way, this is the reason why many pike choose to remain in the same spot for a long period of time. That behavior reduces the probability of chance encounters, minimizing the conflict potential.

Another cause of cannibalism is the lack of prey. Prey is not always abundant, and its availability may vary from year to year or even from month to month. In the 1960s, for example, researchers recorded cannibalism of 10% in the „Greifswald Bodden," attributing it to a lack of prey.

A lack of prey may not always be caused by large-scale fish death. Other times, prey may be absent altogether from the respective area the pike inhabit. Many pike are

faithful to their location over long periods. The presence of certain prey fish, on the other hand, can vary between seasons. Some move into the open water, other prey fish change territory.

The pike are then forced to compensate for the loss with alternative food sources or to move territory as well. Changing territory demands of the pike to cover long distances, increasing once more the probability of chance encounters between pike. As a result, hungry pike will sooner or later cross paths with their conspecifics.

We could put it this way: If the prey is scarce, the pike may end up as prey itself. No matter how large the prey stock, if there is too many pike, there is always a risk.

During the low-vegetation period from the beginning of the cold season until after spawning, pike rarely hunt their own conspecifics. On the one hand, this serves to conserve the species around the spawning season. If pike hunt and eat each other before or during reproduction, this would reduce and endanger the population considerably. And to be honest, which pike male would approach the big females if death were certain? Although, on second thought, knowing the males, they would probably be willing to pay that price.

We assume that pike cross paths much more often during the low vegetation period. Since the prey now mostly stays in the bays and in holes on the bottom, some pike increase their radius of activity. So, whenever the pike population is confined to a small area during the winter months, cannibalism reduces to a minimum. To support this statement, we already know that pike seem to eat much less during the winter months. The hunger does not seem to be very pronounced then. That is quite interesting for we have never come across a bait that advertises itself with „Use me from spring to autumn."

Various observations on cannibalism have revealed that animals which hunt their conspecifics have adapted their physique accordingly. We refer to these individuals as cannibals; animals that have specialized in their own species as prey. We can find cannibals among pike, too. If pike start early to view their conspecifics as prey, this has consequences. Usually, these cannibals are more aggressive than other pike. A large mouth and a stronger body also make it possible to hunt larger species. However, these pure cannibals exist only in small numbers.

Remember

- If enough prey is available, the risk of cannibalism reduces considerably, at least as long as the circumstances do not change.
- If the pike population grows too rapidly in an area, cannibalism increases significantly. The same goes for low prey species population sizes.

Pike defend their territory

Let us put this another way: When pike collide, an interaction ensues. Whether that is a defense reflex, is something we cannot state with certainty at this point. Researchers have observed the interactions of pike in various experiments. Especially larger pike are very aggressive towards their smaller conspecifics. Researchers observed this by introducing small pike to the territories of their larger conspecifics. They were protected only by a wire net, which separated the large from the small pike. What was astonishing is that despite the net, the large pike tried to attack the smaller ones over and over again. They even tore their mouths open on the wire net and could not be dissuaded from doing so. If it was not for the net, the large pike would have attacked and eaten the small ones in a heartbeat.

Attack pattern of pike attacking pike

Figure 3.14—Cannibalism - photos: Peter Berg, guide at Pronature-MV.de

Various attack patterns can be observed and researched as pike hunt their own conspecifics.

According to multiple studies, larger pike observe small pike very closely—they are on high alert when in close proximity. In many experiments, even if the small pike stayed camouflaged, inconspicuous, and did not move, the larger pike faced them. The trigger for an attack differed between attacks.

The following attack pattern was observed:

1. The larger pike swam motionlessly and waited, without forcing an attack. The attack usually started when the smaller pike were moving or somehow distracted.

2. The larger pike approached the smaller ones from behind, bumping the tail fins with their mouths. As soon as the startled, small pike flipped around, the head was attacked.

The surprise factor seems to increase the chances of success and serves to trigger the attack. What is interesting is that attacks on pike that remained motionless in the water were much rarer than attacks on active pike.

3.4.5 Food competition

Food competition among pike is well documented, however, what implications this holds for us anglers has been rarely discussed. Personally, we certainly had not given much thought to this topic before we started our research for this book. Food competition is the non-scientific term for „Intraspecific food competition" that describes the fight for the same resources among conspecifics. It comes to an increase in competition if many individuals of the same species reside in one area. This competitive behavior has been observed in pike as well—anglers have documented in pictures quite often. Like everyone else, we have seen the incredible images of pike protruding from other pike's mouth. However, often this behavior is misinterpreted and classified as cannibalism. It is commonly assumed that pike are part of each other's diets.

However, we should not equate food competition with cannibalism. Food competition describes the competitive behavior among pike over prey and territory. If a pike captures a fish, another pike may be tempted to attack for reasons of competition or hunger. Hence, that pike will try to steal the prey. One advantage of such behavior is obvious: It does not have to expend energy on hunting itself.

Food competition often has a side effect. Competing individuals, such as competitors of the same species, eat more often than if they were to live alone in their habitat. Let's reflect on the pike's attack pattern with food competition in mind, focusing especially on the events that follow after a successful attack.

Securing the prey

We have established that the pike only requires a few seconds to secure its prey. Its teeth are sharp, and its mouth is strong. But here is the kicker: If the pike smells or sees another pike while securing its prey, the time required to secure the prey increases. The pike will not drop its prey, however, becomes vary of competitors, fearing to lose the prey or to be eaten itself. It seeks shelter and escapes, all at the same time if possible. That ultimately prolongs the process of securing the prey.

Holding the prey

This step is impacted by the presence of other pike as well. As with securing, the duration for which the prey is held in the mouth also rises sharply.

Turning of the prey

As we suspect, when turning the prey the same applies. Always on the look-out for other pike, it takes its time while turning the prey. What normally only takes a few

seconds, now can take much longer, depending on the size of the prey.

The time a pike takes to swallow its prey when other pike are present can rise to several minutes—minutes in which pike with prey in their mouths are attractive targets to other pike. That is a multiple of the time it usually takes. Why pike take so much longer—because of the risk of cannibalism or food competition—does not make much of a difference at this point. What is important is that pike attack other pike in order to steal their prey. It is obvious why some pike choose this „hunting strategy." It takes a lot less energy to steal food than to hunt it. Larger pike can take advantage of their size without incurring much risk from smaller pike.

Food competition vs. cannibalism

The number of attacks on pike by other pike is significantly higher when they are busy and distracted. That includes, for example, the devouring of prey. Attacks caused by food competition occur much more often than purely cannibalistic attacks. If the size difference between large and small pike is considerable, it is not uncommon for the larger pike to swallow the smaller pike, including their prey.

In the experiments, attacks based on food competition usually targeted the prey, thus the head of the other pike. Injuries to the eyes of the attacked pike were not uncommon. As a result, depending on the severity of the injury, some of these pike eventually become easy prey themselves, with their hunting and defense tactics strongly impaired.

Remember

Attacks caused by food competition occur much more often than purely cannibalistic attacks. Also, the likelihood of such an attack increases when a pike is busy devouring its prey. Let's talk a few numbers at this point. The occurrence of cannibalism can vary. Studying one year alone, we might conclude that cannibalism does not exist in some waters. Other studies recorded a proportion of up to 10%. Strong differences between months are also common. As a result, cannibalism depends on many factors. It differs from population to population and varies at times.

Food competition—the scientifically correct term is „Intraspecific food competition" — is a lot more common in the animal kingdom than cannibalism. Individual animals or groups steal the food of their conspecifics or occupy their territories. Among hyenas, vultures or some swallows, we can observe the stealing of prey very often. The main motivation behind this strategy is the lower energy expenditure for stealing in comparison to hunting. These individuals are usually more aggressive than their conspecifics. In the case of fish, only a few studies on food competition exist, therefore, we are grateful to have stumbled across studies that specifically discuss the pike.

Our research showed that cannibalism among pike occurs sporadically and takes place only under special circumstances. The greater portion of the attacks between pike are driven by food competition, which sometimes end with the larger pike eating their smaller conspecifics. That supports our conclusion that pike are always looking for an easy meal. What is easier than to steal the food of a smaller, fearful pike?

We know that in the fight for prey, larger pike also regard smaller pike as prey. First, they are smaller. Second, they are often badly injured in an attack. That makes them an easy meal. So, smaller pike with prey in their mouths may be the ultimate prey for large pike—both the cannibalistic and competitive instincts are triggered.

If we were to summarize the contexts in which a pike bait might promise success, this would be our order:

1. Small/medium pike with large prey in mouth—actively pulled to simulate activity.
2. Small/medium pike with medium prey in mouth—actively pulled to simulate activity—medium-sized prey, so that the bait moves better in the water.
3. Small/medium pike with prey in mouth—actively pulled to simulate escape.
4. Small pike—move slow and jerk to stimulate cannibalism.

Remember

However, observation is still required here. If we can activate this behavior in pike, we can use it to our advantage when fishing for pike. When we were working on this chapter, we had to ask ourselves whether pike baits with fish protruding from their mouths even exist. We intensively browsed all the major catalogs and online shops—local and abroad. Unfortunately, at this point, we have not found a bait of this nature.

Small prey can prevent cannibalism and food competition

To escape their own death and protect their prey, pike have developed different strategies. The best option for pike is to keep the hunt short by targeting small prey. We deal with this topic again in detail in chapter 3.5 „The size of the prey“ on page 57. There we will learn which bait size to best pick.

Another very effective means of protection against food competition is to reduce the likelihood of encountering conspecifics. That results in some pike moving to territories that might not provide the best habitat. That can appear self-sabotaging, however, promises many advantages over other habitats, where pike have to compete with their conspecifics.

Some pike also try to reduce the probability of clashes my minimizing their territory as much as possible. For this reason, it is not surprising that researchers have recorded territory sizes of only 30 x 30 feet (10 x 10 meters).

Heads or tails?

Attack patterns for pike differ between prey. However, pike always prefer to attack the head. The reason for this is quite simple: If the prey is not caught head first, the time required for securing, holding, and swallowing increases significantly.

The pike can save time by attacking the head, especially when it comes to turning the prey. That considerably increases the probability of retaining the prey and remaining untouched by larger pike.

Silent Communication

There seems to be some kind of silent communication between smaller and larger pike. Researchers observed this on several occasions. As soon as a larger, potentially threatening pike appears and an escape is no longer possible, smaller pike take on a threat position. They move in a more or less vertical position towards the attacker, stretch their head upwards with their mouths slightly open, and present the underside of their mouth with their gills spread. Then the larger pike usually backs off.

Pike bait presentation

We can present pike baits in spots with pike of considerable size. To find out which edges and corners are the best for this, see the chapter „The Year of the Pike“ on page 119ff.

Move the bait as little as possible. That gives a more natural appearance. Active pulling simulates an activity and may attract other pike. An advantage is that we can keep the bait in the water for a long time.

We should assume that our pike bait will be considered a competitor in terms of food. After all, we are casting the bait into the territory of another pike.

With quick twitches of our rod, we can stimulate potential attackers and defensive pike. Unfortunately, only a small number of baits in the shape of a pike exist. However, the few pike rubber fish and pike wobblers available should help to stimulate the cannibalistic instincts of the pike.

3.4.6 Invertebrates

Invertebrates are organisms without a skeleton. Some of them are an important dietary supplement and sometimes even constitute the main diet. Again and again, pike resort to invertebrates such as crayfish, snails, insects or worms. The invertebrates are not only important for small pike, no, also the big ones like to snack on invertebrates from time to time.

We all know of the baits that imitate invertebrate, such as crayfish and flies. In this chapter, we discuss to what degree such baits might pay off.

Crayfish and insects often make up the largest share of the pike‘s invertebrate diet. Here is the first question: „When and how often do pike resort to this alternative food source?“

Of course, that depends a lot on the conditions in a water body. To get a feeling for the importance of invertebrates as prey and especially as bait, a few scientific results can guide us. The following information is based on various studies, each with over 600 pike caught, conducted at numerous lakes and rivers in Europe and the USA.

Researchers caught pike of different sizes for these studies. The size of the pike ranged from 12-40“ (30cm to 1m). The average size was above the 20“ (50cm) mark.

So what do we know about invertebrates as prey?

On the one hand, the availability of prey fish has a major influence on whether pike consider invertebrates just as a dessert or as a main staple. If many prey fish are available, fish make up over 80% of the pike‘s diet. If the number of prey fish is limited, alternative food plays a bigger role.

Figures from Brown Lake in Minnesota show the following distribution of food for 1997. These figures refer to the total mass in the stomachs of the pike. Not all caught pike had prey in their stomachs.

Alternative food sources

	Spring	Summer	Autumn
Number of pike caught	62	45	58
Pike with prey in the stomach	27	28	34
Fish	59,5 %	81,9 %	79,4 %
Dragonflies	18,3 %	0,0 %	0,0 %
Mayfly larvae	9,0 %	0,0 %	0,0 %
Leeches	13,2 %	1,3 %	3,0 %
Decapods	0,0 %	16,8 %	11,8 %
Other vertebrates	0,0 %	0,0 %	0,0 %

Let‘s take a closer look at these numbers. Fish have always been the main food source for pike. However, we notice the following: We see that the stomachs of many pike were empty. In spring, that was the case for more than half of the pike. During this time, the share of alternative food was highest at over 40%—dragonflies, mayfly larvae and leeches. We notice that almost one-fifth of the total stomach mass consisted of dragonflies or their larvae. Pike must have grabbed a whole lot of those for them to account for almost 20% of the total mass. Mayfly larvae made up about 9% and leeches 13%. In summer and autumn, insects pretty much dropped off the meal plan. Instead, decapods gained in importance.

Dragonflies

Unfortunately, the study does not explicitly state whether these are adult dragonflies or their larvae. One sentence in the study hints that pike fed both. Dragonflies repro-

duce on water, and the larval stage lasts three months to five years, depending on the species. During this time, dragonfly larvae live in the water and develop through different growth stages. They can reach an impressive size of about 2“ (5cm). That is quite big, even for pike.

Leeches

Leeches seem to be on the menu, too. On Brown Lake, they accounted for only about 13% of the pike‘s diet in the Spring of 1997. In other studies that share was a lot bigger. For the pike caught at Jorgens Lake in Spring 1996, leeches accounted for almost 39% of the total stomach mass.

Remember

The numbers show us that insects, crayfish, and other invertebrates can make up an important part of the pike‘s diet—but that is not always the case. The varying distribution of the prey across the seasons was particularly fascinating. We are quite amazed by the occasional amount of dragonflies and their larvae, which can make up almost a fifth of the total stomach mass. Since invertebrates are more abundant in vegetation than in open water, they share the same habitat with pike. Therefore, they are always available to the pike.

However, we have to look at these figures with a bit of perspective. Smaller pike struggle in spring to find prey, as prey fish only occur in abundance after their spawning season. Larger pike can be a lot pickier, able to feed on larger fish as well. If the large ones turn towards invertebrates as a food source—and they do—then they grab a real handful.

The studies available to us did not reveal any significant differences between pike of different sizes in their preference for invertebrates. Rather, insects, crayfish, and others appear to be common food sources of all adult pike.

Note from the “Fishfinders” Team

We are currently working on compiling further information on prey fish, including perch, crucian carp, bream and roaches. We put a lot of heart and soul into our research. In the future, we hope to be able to give even better tips for bait selection and bait presentation. Unfortunately, studies share this information only on the side, causing us to have to read many different papers. In sum, that costs a lot of time.

3.5 The size of the prey

What is correct? They say „large pike eat large fish“ and „you have to use big bait to catch large pike.“ We have all seen the 8“ (20cm) plus baits, haven‘t we? Let‘s investigate these statements from the perspective of science.

Yes, it is true; the larger the pike, the bigger its preferred prey. But what is big?

The size of the prey depends on the size of the throat. Anything that fits qualifies as potential prey. With pike, we know that they have a large throat and therefore can and will hunt large prey in relation to their body size. However, the size of the pike only determines the maximum length/width of its prey. That does not imply that pike only feed on large prey. On the contrary, large pike also eat small prey fish in large quantities. Some even prefer the smaller sizes altogether.

There are several reasons for this. On the one hand, the size of the prey varies depending on the season. In spring, after the spawning season, only adult prey fish are available. In summer, however, pike cross paths with many smaller prey—”small” can equate with inexperienced and easy prey.

On the other hand, it depends on the availability of the prey and the opportunity for an attack. If the pike is in hunting mode, it will wait for easy prey and not necessarily for the biggest one. It knows its strengths as an efficient predator and does not care if it has to strike once or twice. It does not consume much energy during those short attacks and spends the rest of its time motionlessly. The pike is primed to not waste energy. A statement shared across many studies supports this perspective—we paraphrase:

„The pike is a picky predator that feeds on small prey, prey that is much smaller than predicted by optimized hunting models.“

3.5.1 What is the optimal prey size for pike?

Various studies covered another important aspect: If pike are at risk of being eaten themselves or to be denied their prey, the choice of the prey size is impacted. Pike are strongly guided by their instincts, instincts that decide whether a prey/bait is attacked or not.

Researchers have observed that pike can significantly reduce the risk of falling victim to other pike themselves. By this we mean the risk of:

1. getting their prey stolen or
2. to be eaten.

To minimize both risks, many pike hunt small prey fish that they can devour quickly. With small prey in their mouths, pike are of less interest to their larger conspecifics. As a result, in some experiments, other pike often ignored the feeding pike if its prey accounted for only about 15% of its body length.

An example should give us a sense of the size proportions. If a 28“ (70cm) pike is preying on a 4“ (10cm) prey, it is unlikely to get attacked. 4“ (10cm) is less than 15%

of its body length. Instinctively, larger pike know that an attack is not worthwhile, because the smaller pike will devour its prey too quickly.

If large pike have large prey in their mouths, they become an attractive target for other large pike that feel superior and stronger. Even if the 28“ (70cm) pike is no longer at risk of being eaten itself, there is still the danger of losing the prey and to get injured.

Small pike are an even more attractive target if the ratio of prey to body length is unfavorable—it is bigger than 15%. For example, a small pike of 10-12“ (25-30cm) with a 4“ (10cm) long prey in its mouth, will attract larger pike. Small pike with big prey present an easy meal, maybe even two. Attacking smaller, preying pike is a great alternative for larger pike, giving them extra energy to become the biggest pike in the water.

3.5.2 Length or height

Let‘s look at the optimal prey size from a different perspective. A significant factor according to which the pike will hunt is not only the length but also the height of the prey. It greatly influences whether the pike can get the prey down its throat. Each pike has its specific maximum gap size. Average values from various experiments are available. They reveal the maximum height of prey, which can vary from pike to pike.

- Pike 1 - length 24“ (60cm), gape size about 2.3“ (5.8cm)
- Pike 2 - length 28“ (70cm), gape size about 2.6“ (6.5cm)

So, now the facts are on the table. A bait targeting a 28“ (70 m) long pike should have a maximum height of 2.6“ (6.5cm). Yes, we can estimate that.

The question remains: „How many pike hunt according to their maximum prey size?“

To illustrate this, a few numbers from different experiments should help us again, with high-backed bream and slender roaches as the main prey. Both are an important food source for pike in many waters. However, view these numbers with caution, as some were not stated explicitly and had to be derived from graphs. Values that can deviate by a few millimeters, we mark with „approx.“

Different experiments studied to what extent pike select prey based on their body length and gap size.

3.5.3 Results

We can say in advance that only a few pike will hunt according to their maximum prey size. Some pike do not care about their scientifically measured gap size, and may even hunt bigger prey. So these pike hunt prey that is bigger than their theoretical maximum. One or the other pike chose prey that was about 0.5-1“ (1-2cm) bigger than its gap size. However, such attacks were rare across the experiments.

Nearly all prey fish lay within the gap size of the pike. The pike mainly chose roaches and slender bream as their prey. In terms of prey fish species, the pike preferred roaches to bream of the same height.

Most of the time, the preferred body height was far below the average gap size. The

emphasis here is on „far below.“ The height of about three-fourths of the eaten bream and roaches was less than half the maximum gap size. Therefore, only one-fourth of the eaten prey fish were of the maximum size. Most often the pike preferred smaller prey fish.

With a pike of 28“ (70cm) body length and 2.6“ (6.5cm) gap size, this would mean that we should choose a bait of about 1.2“ (3cm) in height. That should remove one or the other bait from our bait box.

We can explain the pike‘s preference for slender and small prey with the time it takes devour prey. While pike can swallow small or slender prey fish within a few seconds, that time increases to 1-2min for prey fish with the maximum size. That is quite the increase. That is 1-2min during which pike are at risk of an attack.

Food competition is widespread among pike. It has a big influence on the preferred prey size. Lost prey equals a waste of energy, causing the pike to have to hunt again. Every attack can result in serious injuries, with the pike potentially falling prey to another predator. Every pike is instinctively aware of this. Only if the pike can quickly devour its prey, can it hold off other predators.

Remember

In principle, the preferred prey size increases with the growth of the pike. However, much evidence exists, suggesting that pike rarely hunt prey of the maximum size, preferring small or slender prey.

Maximum size prey fish increase the risk of falling victim to other pike. However, these predators are specialized predators, so there are some pike that mainly target large prey.

- Most prey fish are only half the size of the gap size.
- Most pike prefer small prey fish because they are easier to catch, quickly secured and devoured.
- Large prey fish may be easily stolen.
- Pike endanger themselves when they hunt big prey. Some are willing to take this risk.

„If you bet on big baits, you will catch big pike!“ That is what they say. We do not wish to make the absolute statement that smaller baits work best for pike fishing. However, it is a fact that only some of the larger pike go for big prey. Many pike seem to disagree with anglers when it comes to the perfect bait size. Even though in the experiments 75% of the prey fish were only half the maximum size, this proportion will differ between waters. Certainly, there are variations from water to water and between pike. So judge these findings with your personal circumstances in mind.

Remember

With our knowledge from various studies, we can state with conviction that big baits work mostly for large pike. However, that does not imply that large pike will go for them.

To get a better idea of the optimal bait size for pike fishing, we consult the results from various studies. The length of the bait should be between 4-6“ (10-15cm). That size is attractive for most pike. Other studies refer to a length of about 20-25% of the pike‘s body length. However, it is essential that the bait is kept slim.

3.5.4 Why do we hear so often that only big baits produce big pike?

This question has been our minds since we first started writing this chapter. We cannot get it out of our heads. Much of what we have read and learned contradicts this common assumption. What causes this perceived or real contradiction?

Firstly, it is true that big baits are more attractive to large pike. Medium-sized pike do not jump on baits of 8“ (20cm) or more in size as often as large pike. If you are exclusively fishing for large pike, you can use a bigger bait to avoid hooking medium-sized pike.

Secondly, we are all Marketing and Media-driven. We often see pictures of large pike with big baits in their mouths—baits 8“ (20cm) or more in length. We also receive plenty of advertisement that reiterates this belief. Newspapers, magazines, and blogs hardly ever display captured fish without a bait in the mouth. Large fish are a great selling point for bigger baits.

What additionally strengthens the statement „big bait equals large pike“ is the statement itself. If you want to fish for large pike, you buy big baits because that is what you have been taught. And, of course, if a pike bites, it is likely a bigger one. What we experience shapes our opinion, causing us to forget the many unsuccessful days on the water on which we used the exact same bait.

Maybe, it is what we do not see that should draw our attention. We rarely get to see pictures of large pike with medium-sized baits, 3-5“ (8-12cm) in length. Why? The reason is quite simple. Many anglers reject the idea of catching large pike with smaller baits from the outset. So, less of us try. That leads to fewer catches overall. And when a big pike strikes a small, tiny bait, it is regarded as a coincidence or shared as an insider tip.

3.5.5 Considering everything in relation to one another

We would like to emphasize once more that we do not aim to turn the fishing world upside down. If we look at this chapter matter-of-factly, however, it should provoke reflection. Not all large pike hunt exclusively for small or big prey. Likely, more import than the discussion on size is the discussion on height. In the end, it is the height of

the prey/bait that decides whether the pike attacks.

Long slim or high baits have advantages and disadvantages. They reduce the likelihood that small pike will bite. That minimizes injuries to smaller pike. On the other hand, baits that are too long or too high exclude a number of larger pike, particularly those that want to minimize the risks of food competition and cannibalism. These pike will avoid big prey. That increases their chances of survival, as they avoid the risk of falling easy prey to their more aggressive conspecifics. If the population size of pike is large, that risk gets even bigger.

Pike differ in their prey preference and in their nature. Take the fear of risk or the need for security, whatever you may wish to call it. Some pike are opportunists, considering the payoff rather than the downside. Others are more risk-averse. Something similar we can observe on our autobahn: Many drive slower than the speed limit, some even at a snail‘s pace, while others try to get the most out of their cars, willingly putting themselves and others at risk. Are we right? It is not smart, but they do it anyway.

In terms of hunting, pike develop different skills from one another. While some have specialized in maximum size prey and can hunt and handle it excellently, others target smaller and slimmer prey. In the end, the pike‘s instincts and context will determine the size of the prey.

Remember

Long or high baits attract larger pike. So much is certain. However, smaller and slimmer lures can produce pike of the same size. The question is whether to offer a bait that is attractive to many large pike or just a few. If you are satisfied with your big bait returns, keep up the work. All is going great. If not, maybe it is time to try something new.

Chapter 4

Environmental factors

4.1 The environment and various influences

We have looked so far at some of the pike‘s behavior-determining factors and the relationship between the pike and its prey. We call these factors biotic factors because they are environmental factors which living organisms directly impact. In the following chapters, we will look at some abiotic factors that affect pike in their habitat. These environmental forces include physical factors such as temperature, light conditions, wind, but also chemical factors such as oxygen concentration, salt content, and more. The pike has no influence on these factors and can only react to their changes. All these factors strongly influence the behavior of the pike and have an impact on our fishing success. They may have different values at different locations in the same water body.

For example, the water temperature, influenced by the wind, can be 3.6°F (2°C) warmer in one bay than in another. Specific for pike fishing, the following chapters will give us a basic understanding of the effect of individual abiotic factors on the behavior of pike. Before that, we need to acquire a little background knowledge about water bodies as ecosystems.

4.2 The temperature

Temperature is one of the most significant factors that shapes and influences life under water. The sun, nature‘s clock, is its primary driver. Temperature has a great effect on the growth and development of pike. Young pike must grow quickly to survive. They need different living conditions to older and larger pike. If just one growth stage experiences unfavorable living conditions, growth and development are impaired.

For some waters, researchers have already demonstrated that future pike populations may be affected by these changes. If we can understand the effects of different temperatures on water bodies and ultimately on pike and fish stocks, we can catch the right moments to fish, better assess hotspots and pike the best baits. That saves money and allows us to fish more.

4.2.1 Temperature and pike

Growth

The ideal water temperature for pike varies between growth stages. While the small, freshly hatched pike prefer water temperatures below 68°F (20°C), the juvenile pike have the best growing conditions in summer at 68-75°F (20-24°C). Growth is optimal at these temperatures. As pike develop, they increasingly prefer cooler habitats. For larger pike, 66°F (19°C) warm water provides an optimal habitat.

In areas of the 40th parallel north (northern Spain, northern Italy, Nebraska, Kentucky, Michigan), the pike grow quickly in the winter months. When the water temperature rises above 70°F (21°C) in the hot summer months, they gradually slow down their activity to such an extent that pike tend to shrink rather than grow. The males, in particular, lose weight. Only once the water temperature approaches the 68°C (20°C) mark, does the weight gain accelerate again.

In northern latitudes and cooler waters, it is different altogether. Here, pike need a few more years to reach the same lengths as their conspecifics in warmer waters. Water temperature has a significant influence on pike growth.

How active are pike? When are they active?

The water temperature has a decisive effect on the activity level of pike. Not only because of the uncomfortable heat, but also due to the reduced oxygen concentration in the warm water—more on this later. Starting at a water temperature of just above 68°F (20°C), the first larger pike start to reduce their movement and food intake. Their swimming speed decreases, to reduce energy consumption.

The larger pike leave the warm shore areas and actively seek cooler waters. They retreat in the direction of the sharp drop-off. Regularly, pike stay around 3-6ft (1-2m) lower midsummer than in the weeks before or after. Males and females react differently. While males hardly grow and even lose weight in summer, females continue to gain weight. Egg production is energy-intensive and demands a heavy diet. The largest females move to the deeper and cooler regions if possible. Here, they can cool down and continue to feed. Frequently, the pike restrict their feeding to dusk.

If we look at water temperatures throughout the year, the temperature-dependent growth process of pike becomes apparent. At low temperatures below 48°F (9°C), growth declines considerably. However, unlike many other fish species, pike also grow during the cold season. Growth picks up again as soon as the water reaches approximately 50°F (10°C). Then, the activity level of many pike starts to rise continuously and only declines again above around 70°F (21°C). We can express the activity level in terms of swimming speed, the distance covered and also the frequency of spontaneous swimming maneuvers, for example, attacks.

Activity in correlation to water temperature (approximate data)

Low activity	< 43°F (6°C)
Well activity	> 48°F (9°C)
High activity	63°F – 70°F (17°C – 21°C)
Low activity	> 70°F (21°C)

The missing values in the temperature data represent a transition. In addition, the respective activity of individual pike will deviate from these temperature values in one direction or the other, depending on the water body and also the unique characteristics of each pike.

Remember

Feeding and other activities are closely linked. For us, this means that the water temperature signals how much the pike will bite. It is important for us to study the activity patterns of pike. It allows us to estimate when we should fish slowly and when faster. Especially when fishing between seasons, one must understand the activity pattern of pike.

We can easily measure the temperature in relatively shallow water. Often, temperatures are also available online. With a thermometer, we can measure the temperature from the shore. Mobile fish finders for the fishing rod also help, showing not only the temperature but also the location of the larger fish. We use a Deeper for the shore area. Those of us on boats have it easier because they usually have a fish finder on board which can indicate the temperature.

Figure 4.1—Deeper temperature display

4.2.2 Temperature fluctuations as trigger

Another important factor can quickly alter the temperature: the time of day. In the different months, the sunlight can alter the behavior of the fish in the span of a few hours. For example, in the first months of spring, the water temperature on the surface can rise from around 39°F (4°C) to over 43°F (6°C) during a beautiful sunny spring day. Yes, that does not sound like a lot. However, such a small rise can cause a short but intense feeding frenzy among the pike. If you have been moving from one hotspot to another all day without success, you could have the day of your life in no time at all. Of course, it is another challenge entirely to last that long on the water in frosty temperatures.

How often and when these phases occur differs between years and also depends on the latitude. If you frequently experience such short temperature spurts, you should make one or the other extra catch.

4.2.3 Temperature variations and energy consumption

As we have already seen in chapter 3.3.1 „Hunger and feeding“ on page 29, pike feed little in winter at low temperatures. The reason is simple: they require much less energy as their metabolism slows down during a drop in water temperature. Let‘s assume that at a water temperature of 72°F (22°C) a pike hunts a prey fish of 4“ (10cm) length. That energy should serve it for 1-2 days. With a water temperature of 61°F (16°C), the same energy intake should last 1.5-2 days longer. At a water temperature of 36°F (2°C), the pike can last several weeks. The individual activity of the pike causes a variance of these values. Still, it is quite amazing that a prey fish can provide enough energy for several weeks during the cold season.

But how can that be? Pike are cold-blooded animals which body temperature and metabolism adapt to the respective water temperature. At a water temperature of 39°F (4°C), the heartbeat slows down. The entire metabolism reduces to a minimum. Fish and especially pike are perfectly adapted to cold water. For this reason, even the smallest changes in water temperature can cause their activity to increase or decrease in an instant—they start biting from one moment to another.

But not only in winter are low water temperatures available. In summer, the lower layers of the water column offer cool water temperatures, too. Large pike can actively react to various temperature fluctuations and choose the optimum water temperature; they choose warmer or colder water layers. At a depth of 25-65 ft (8-20 m), the water is noticeably cooler even in the hot summer. At these depths, the pike can escape the stress of high water temperatures. They reduce their energy consumption considerably and get by with less prey. Studies in the Great Lakes between the USA and Canada have proven this behavior in pike. During warm days, the largest pike (>30“ (75cm)) visited depths of 40 ft (12m) or deeper. Since fish avoid big and sudden temperature-fluctuations, they do not dive quickly but take their time. How long exactly depends on the respective pike. Their metabolism must first adapt to the respective water temperature.

Remember

The water temperature has a massive influence on how hungry pike are. Cold temperatures below 43°F (6°C) slow down the activity of some pike causing them to eat only every few days. If the water is warmer, the activity level increases among all pike. There is a good balance between exercise, appetite, and feeding between 50-70°F (10-21°C) water temperature. In these temperatures, you do not have to worry much about pike being lazy.

If the water is noticeably warmer, it will stress the larger pike. Although their energy requirements are now high, it does not mean that they will feed more. Many pike will try to manage their energy consumption by moving to cooler water or by reducing their movement to a minimum. One or the other pike may even go hungry because this often consumes less energy than active hunting.

When the temperatures are cold, we should reconsider our bait presentation. Once the pike‘s metabolism slows down, it is all about energy preservation. It will think twice about tracking a fast prey/bait. Likely, it will ignore it and wait for slower prey.

The same applies to warmer water. The pike must save energy and is grateful for easy, careless, sick or dead prey. Slowly reeled artificial bait or a dead prey fish offer the best odds in these unfavorable water temperatures.

4.2.4 Temperature and effects in stagnant waters

Large and small lakes, but also oceans, are standing waters.

The temperature in a water body is not the same everywhere. Even small fluctuations can have a major impact on the habitat of fish, depending on the water body. For example, the oxygen content of a water body changes as a function of temperature.

It is difficult for us humans to comprehend these changes because we hardly notice or do not see them. If we look down from above the waterline, much of what has a direct influence on pike fishing remains hidden.

Let‘s look at the effects of temperature on water from different angles. Compared to pike, humans do not have to adjust quickly to temperature changes. We have some days of rain and others of sunshine. From time to time there is a rise or decline in temperature. Some days we were a jacket, on others a T-shirt. Our life is pretty easy with respect to managing temperature fluctuations. If we travel by plane, things look a bit different. Then we become acutely aware of strong climatic changes. However, our body temperature remains around 99°F (37°C).

In the water, the changes are much more acute for the fish. Pike are cold-blooded animals. That means that their body temperature adapts to the ambient temperature. The temperature has a decisive influence on the pike‘s metabolism. We humans, on the other hand, are warm-blooded animals and our body regulates its own tempera-

ture, especially against external forces. Fish can withstand temperature changes only moderately. We know from industrial fish farming and the transport of fish that temperature changes of more than 41°F (5°C) can lead to death within 24 hours.

Water is an excellent heat accumulator and has remarkable thermal properties. That creates a balanced habitat for the fish in some waters. In other waters, the fluctuations are more pronounced, especially between different depths. However, water conducts heat very poorly. Only by the movement of the water— think of wind—is heat transported to the different water layers. In shallow waters, the water is well mixed, and there are hardly any temperature variations from the surface to the depth.

4.3 The stratification of a standing water body

Under certain conditions, layers can form in standing waters, caused by reduced water movements. Thermal layers—layers of different temperatures, are familiar to us. However, variations in oxygen and salt content can also cause differences in the water column. Knowledge of these layers will allow us to locate the optimum habitat for pike.

The individual layers of a water body can guide us in locating the best pike hotspots.

4.3.1 Thermal layers

Large stagnant waters with a depth of more than 16ft (5m) may become thermally stratified—warmer water rises and layers itself on top of the cold water. Variations in density between water molecules at different temperatures cause this phenomenon. The density of water is highest at 39.16°F (3.98°C). As temperatures climb or fall, water expands, causing it to rise. Consequently, the upper layers of water tend to be warmer and ice layers float without sinking.

As temperatures rise, the density difference within the water increases, forming a water body with distinct layers. A few numbers should help us to understand.

Density of water at normal pressure

▶ 37°F – 8.3451 lbs/gal ▶ 39°F – 8.3451 lbs/gal ▶ difference: 0.0001 lbs/gal	▶ 3°C – 999.96 kg/m^3 ▶ 4°C – 999.97 kg/m^3 ▶ difference: 0.01 kg/m^3
▶ 68°F – 8.3304 lbs/gal ▶ 70°F – 8.3286 lbs/gal ▶ difference: 0.0018 lbs/gal	▶ 20°C – 998.20 kg/m^3 ▶ 21°C – 997.99 kg/m^3 ▶ difference: 0.21 kg/m^3

To emphasize this one more time:

„The difference in density between 68 and 70°F (20 and 21°C) warm water is many times greater than that between 37 and 39°F (3 and 4°C).“

For us, the figure of 0.0018 lbs/gal (0.21 kg/m3) may seem small, but these special density properties of water cause stratification in most stagnant waters in the northern hemisphere. The stratification changes over the course of a year. For example, in the

mid-latitudes (Central Europe), the stratification is more pronounced than in northern Norway or southern Spain. In the tropics and Arctic regions, the conditions underwater are quite different altogether.

For pike fishing in our latitudes, a basic understanding of the stratification of water is necessary, because it helps to locate pike hotspots. For example, all anglers should at least know about the thermocline.

4.3.2 The spring turnover

Let‘s look at the stratification of a water body over the course of a year, starting in spring. Throughout the winter, the water is equally warm or cold in the entire water column. In Central Europe, depending on the duration of the winter period, the water temperature is likely around 39°F (4°C) on the bottom and either a little higher or lower in the surface area. Due to the cool constant temperature, the entire water column mixes. Accordingly, we speak of a spring turnover.

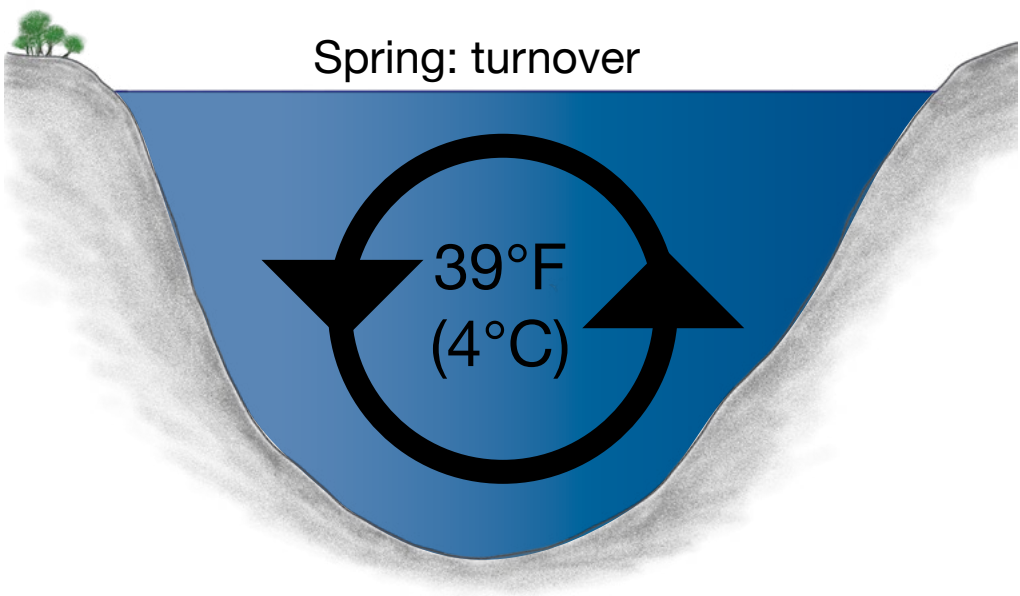


Figure 4.2—Spring turnover

The first rays of sunshine in March and April will warm the surface water. Since the water is still quite cold depending on the region, the slightly warmed water layer mixes due to repeated water movements. The temperature differences are minimal.

4.3.3 The summer stagnation

In May, when outside temperatures often reach summer levels, the surface water

heats up rapidly. Now, the difference in density of the water increases with rising water temperatures. A 59°F (15°C) layer does not mix so easily with a 61°F (16°C) layer. The temperature now drops towards the depth and different thermal layers form. The warm layer of surface water we call epilimnion.

If the wave movements do not reach to the bottom, in late spring or early summer, the thermocline forms. We call the result a thermal summer stratification. That means that the water no longer mixes at a certain depth and the water temperature drops sharply within a few feet / meters. That layer we call the metalimnion or thermocline.

Let us briefly comment on the lowest layer. It is called hypolimnion. Here, the temperature is almost constant, so the water only mixes within the layer.

Nutrients from the upper layer (epilimnion) reach the depths in the form of, for example, dying plants and animals, and get consumed by the living organisms there. The consumption consumes dissolved oxygen from the lower water layer (hypolimnion) and can cause life-threatening conditions for the fish if the oxygen concentration is close to zero and, for example, hydrogen sulfide forms. Life in the lowest layer is then severely restricted with maybe only a few inhabitants.

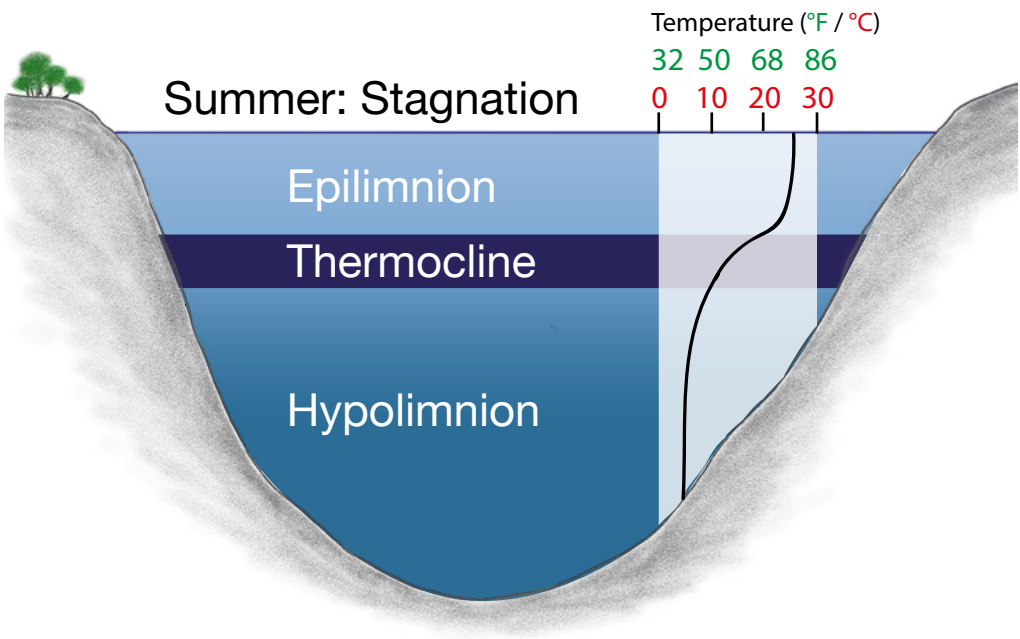


Figure 4.3—Summer stagnation

4.3.4 The thermocline

At this point, we have to look at stratification with a bit of context because only in deeper lakes a stable stratification develops. Stable stratification is divided into three areas—epilimnion, metalimnion, hypolimnion—and remains stable from early summer into autumn.

The stable stratification has a great influence on life under water. Most fish stay in the upper layer because the temperatures here are warm and there are enough light, oxygen, and food from plants and plankton. So, most of the time, we should fish this layer.

How deep is the upper layer?

In other words, at what depth does the thermocline start? It varies and depends on the circumstances. If a stable stratification forms, it is deeper on sunny, calm days than on windy, cold days. We have different options to determine the depth of the epilimnion, to find the optimal fishing area.

Sometimes we can see the thermocline on a fish finder. The signals of the fish finder get reflected by the algae and suspended matter concentrated in the thermocline so that we can see it more or less clearly on the screen. It depends on the correct setting and a little luck. More on this in our book „The Ultimate Fish Finder Guide."

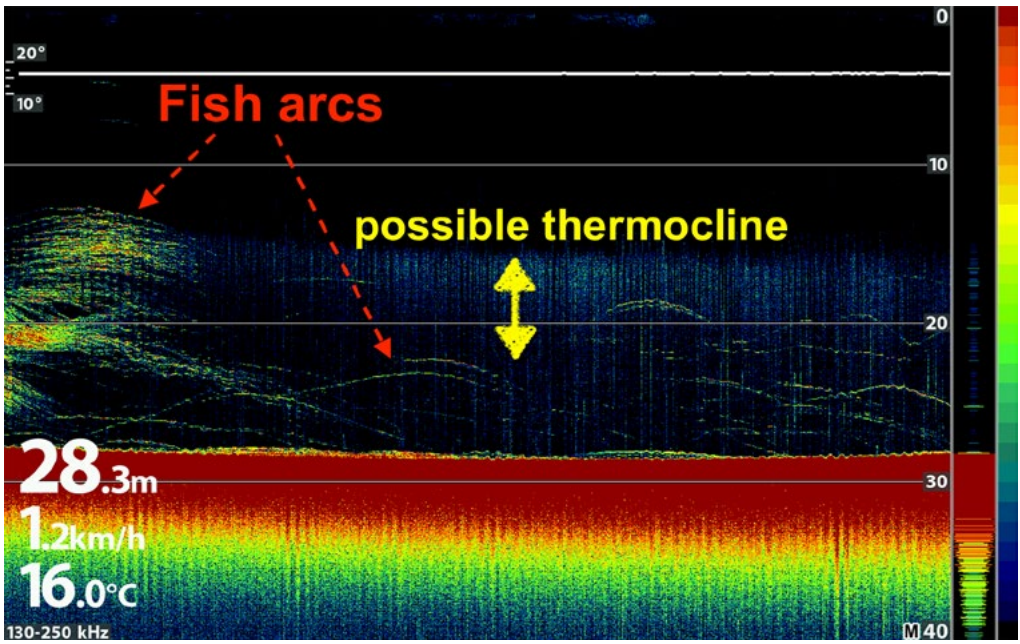


Figure 4.4 — Thermocline at 50-66 ft (15-20 m) depth (depth sounder: Garmin)

A temperature logger offers us a second way of detecting the thermocline. With this device, we let the thermometer into the water, and it measures the temperature at 3ft (1m) interval, recording the values digitally. Once the temperature drops sharply within a few feet / meters, we have found the thermocline. Let's take the following temperatures from a measurement in September as an example.

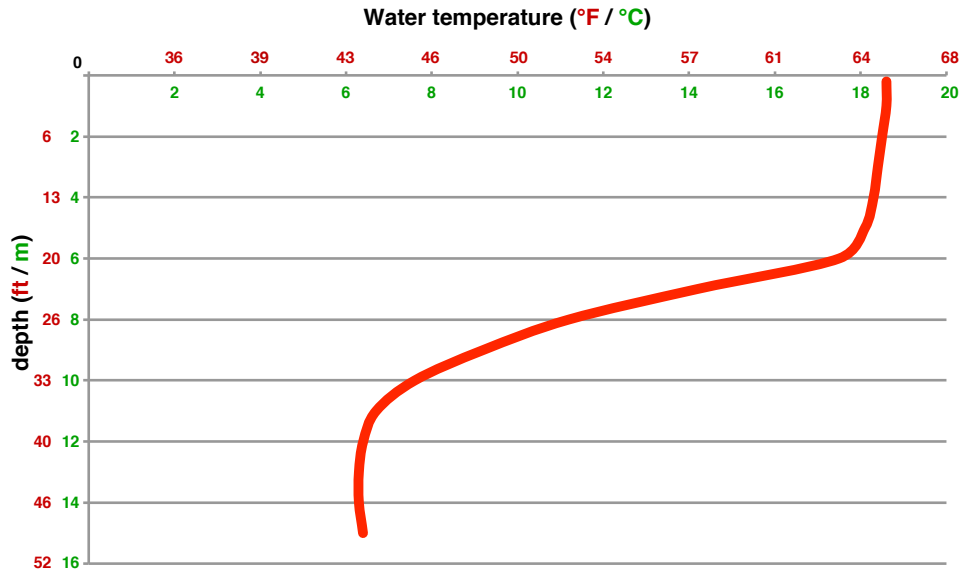


Figure 4.5—Temperatures at different depths

We can see the drop in temperature at a depth of 20-33 ft (6-10m). Starting at 36 ft (11m), the temperature is almost constant again. With this knowledge, we can estimate the best fishing spots quite accurately. Most of the fish stay high up in the water column in the epilimnion, and we do not have to fish deep. In this example, if you unknowingly suspect the pike at greater depths and run your baits 40 ft (12m) deep, you can expect a dull fishing trip

Remember

In oligotrophic waters, the thermocline is not necessarily an unbreakable barrier for fish. The fish will typically find the depth that suits them best. For example, we can find European smelt at depths of 85-100 ft (25-30m), even if the thermocline is at 40 ft (12m).

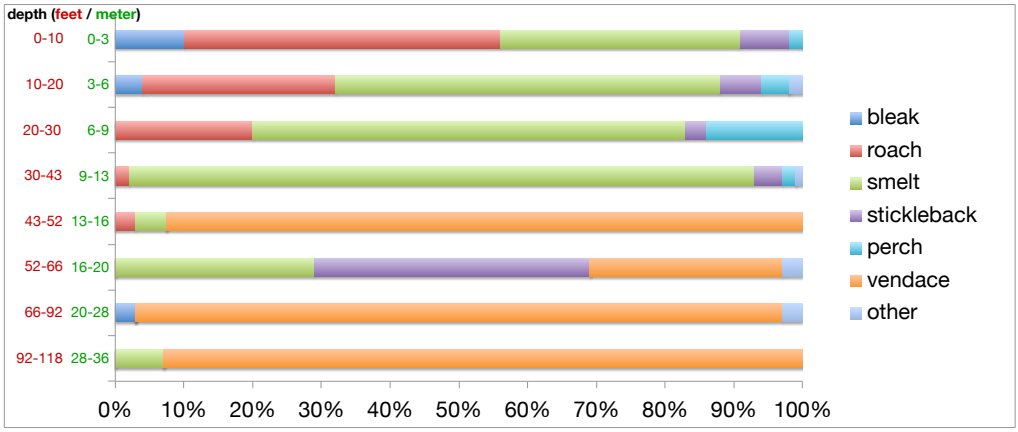


Figure 4.6—Underage prey fish in the open water of the oligotrophic Werbellinsees at night

Remember that a stable stratification and the thermocline are phenomena of deeper lakes. Lakes that are shallower than 16ft (5m) commonly do not have a thermocline. In these lakes, the water column is almost uniformly warm in summer.

4.3.5 The autumn turnover

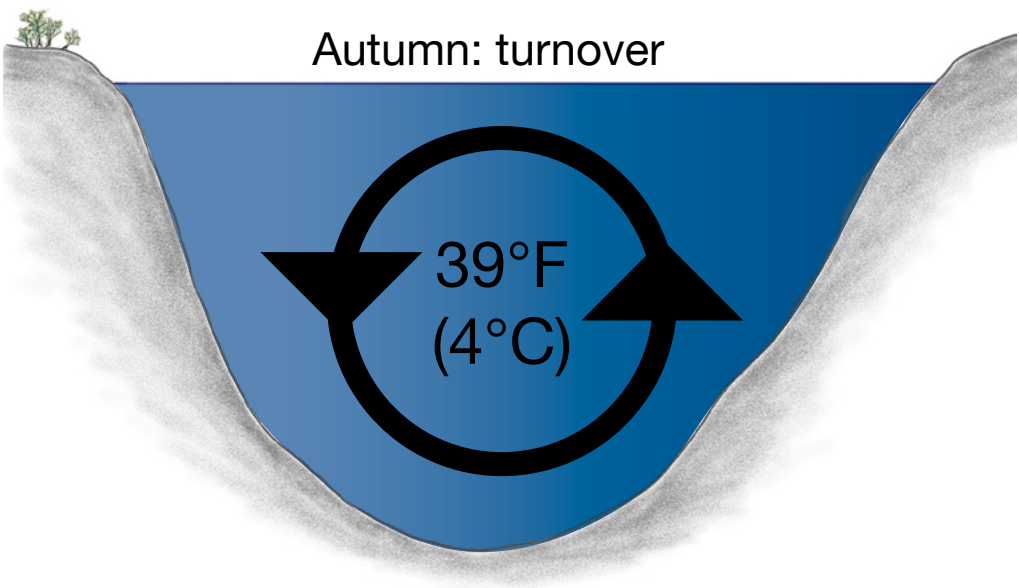


Figure 4.7—Autumn turnover

As the summer draws to a close, the surface temperature drops due to the cold nights in September and October. If the water temperatures of the upper layer fall below 61°F (16°C) and further, the temperature variations between the upper and lower water layers decline. The difference in density between the layers becomes smaller and smaller.

At some point, the entire water column may mix due to the movements in the water. We call this phenomenon the autumn turnover.

With no thermocline, the entire water column serves as habitat for the fish. Depending on how deep and structured the water is, the fish may reach new feeding grounds.

The autumn turnover or the dissolution of the thermocline causes a shift in the life underwater during the last months of the year. During the summer, the nutrients in the lowest layer (hypolimnion) get almost fully consumed. That can result in the formation of toxic substances such as hydrogen sulfide. With turnover, the toxic substances spread throughout the water column.

The fish stock as a whole is coping well with the effects of the turnaround. The fish are used to it and adapt to it. Nonetheless, adaptation takes time, and everyone reduces their food intake to cope. Two to three weeks from the collapse of the thermocline, life underwater calms down again. Pike and prey have regrouped, occupying new habitats and adapting their feeding habits accordingly. If prey fish are scarce now, the pike switches to crabs or other prey.

Remember

In stratified waters, the collapse of the thermocline causes stress for the fish. The number of bites drastically decreases. Only once the conditions have returned to normal does feeding resume.

4.3.6 Winter stagnation

Towards winter, the water continues to cool down. Depending on the latitude, the entire water body reaches a temperature of 39°F (4°C). If it continues to cool due to the outside temperatures, the temperature in the upper water layer starts to drop below 39°F (4°C). At temperatures below 32°F (0°C), ice starts to form on the surface.

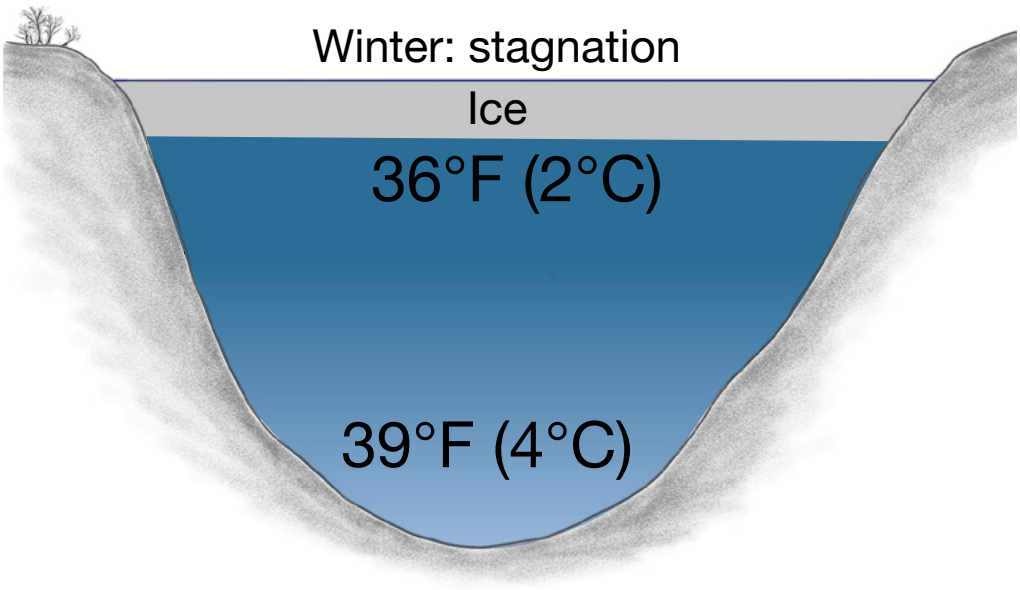


Figure 4.8—Winter stagnation

Remember

We find the warmer water at the bottom of the water column during the cold season. Here most fish, no matter if prey or predator, stay in close proximity to each other. However, the habitat is not only limited to the depth.

4.4 Oxygen

Oxygen forms the basis for the animal and plant life underwater. It is dissolved in the water so that the fish can breathe it through their gills. Compared to air, the oxygen concentration per liter is lower. While we have 400 mg oxygen per liter of air at our disposal, the maximum oxygen saturation in water is 15 mg per liter of water (at normal air pressure).

To draw conclusions about possible hotspots for pike fishing, we must consider the following: Oxygen does not always occur evenly in the water column. There are some areas with a high oxygen concentration and some areas with a low concentration. These areas vary throughout the year as well as during the day. We conclude that hotspots are temporary in nature, existing only for a few weeks, days or even hours.

In addition, fish have different oxygen requirements. Certain fish species we find more often in areas with a high concentration of oxygen, others in areas with little oxygen. Basic knowledge about the required oxygen concentration for our respective target

fish gets us a lot closer to catching them.

We have an almost constant oxygen concentration in the air. It does not change much in rain, sun or snow. The oxygen concentration only decreases considerably at higher altitudes. In water, the corresponding processes function quite differently. The oxygen concentration depends on the water temperature, and we know that this can vary depending on the depth and season. Oxygen dissolves much better in cold water than in warm water. The oxygen concentration is, therefore, higher in cool water. We leave this statement as is and will refine it in the following chapters.

An example illustrates this statement. Trout with a high oxygen demand often live in clear cold streams or lakes. These waters mostly occur in the highlands or are scarce in food. Trout rarely inhabit waters that heat up in summer due to their location, size, and depth. The temperature fluctuations are too extreme in these waters thus creating a low oxygen concentration. They cannot survive an oxygen content of less than 4.5 mg/L permanently. For an optimal metabolism, they need about 8-10 mg/L dissolved oxygen.

Temperature		max. level of oxygen in the water		Saturation
°F	°C	lbs/gal	mg/L	%
32	0	0.0001218429	14.6	100
35.6	2	0.0001151666	13.8	100
39.2	4	0.0001093248	13.1	100
42.8	6	0.000103483	12.4	100
46.4	8	0.000098475773	11.8	100
50	10	0.00009430307	11.3	100
59	15	0.000083454045	10.0	100
68	20	0.000075943181	9.1	100
77	25	0.000069266857	8.3	100
80.6	27	0.000065094155	7.8	100

The values show us how high the dissolved oxygen in the water is at different water temperatures. The physically maximum saturation varies due to many factors, which we cover in the following chapters.

4.4.1 How does oxygen actually get into the water?

Oxygen can dissolve in different ways in a water body. Plants and algae play the most important role. The sun‘s rays hit the water surface and are partially reflected. However, some sun rays also enter the water. If they reach far down, vegetation can develop. Plants use the light for their photosynthesis—plants produce pure oxygen and no air. So, it is the underwater vegetation that produces oxygen. Moreover, oxygen dissolves at the water surface when air and water mix. The movement of the water

then distributes it.

4.4.2 How much oxygen do fish need?

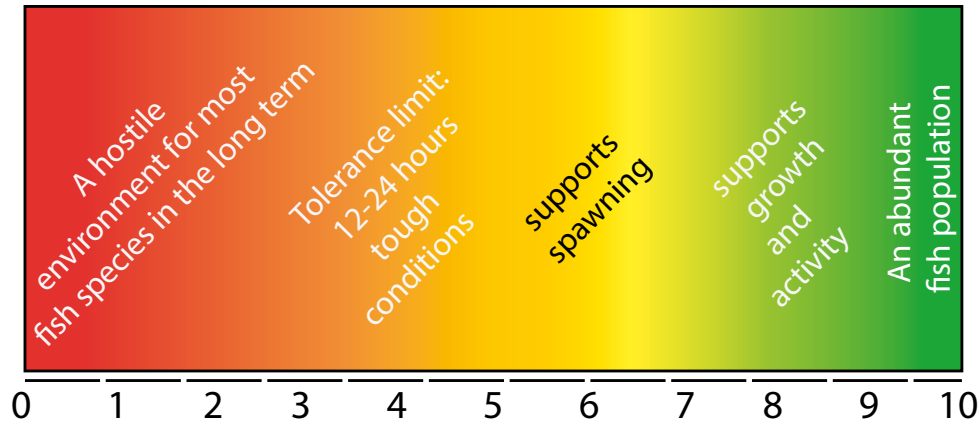


Figure 4.9—Oxygen concentration (mg/L) and effects

Many fish, including pike, can easily handle low oxygen concentrations for a short time. They are adapted to their habitat and react instinctively when the oxygen concentration drops. How much oxygen fish need depends on the fish species, the individual fish and the circumstances.

An oxygen content of about 6-9 mg/L, we assume as the normal level for most fish. Different fish species will be more tolerant than others. Fish found in oligotrophic waters require more oxygen than fish in generally warmer and more nutritious waters (mesotrophic, eutrophic, polytrophic). The oxygen content is a factor that causes the occurrence of different fish species in waters of different trophic states.

Some fish need relatively little oxygen to survive. For example, for a period of several hours, the minimum can be 3-4 mg/L depending on the fish species. For pike, it may even be lower. Oxygen concentrations above approximately 5 mg/L offer the best conditions for active pike. In these conditions, pike are hungry and move around to actively hunt. If the oxygen content drops below 5 mg/L, the pike slowly stop feeding. The pike then try to move to better locations or remain in their spot if the oxygen concentration already provides the optimum range. They try to endure the lack of oxygen and reduce unnecessary physical activity no a minimum.

However, fish must react to extremely low oxygen concentrations. Either they leave the area or, if not possible, adapt their bodily functions accordingly. Fish will reduce their movement to a minimum and stop feeding until oxygen levels return to normal.

Pike are tolerant of low oxygen concentrations. Anglers have caught pike at sites with a concentration below 1 mg/L. These are values which most other fish species would not survive.

Medium and large pike can survive such an oxygen shortage over a longer period of time. For this reason, we can catch them in spots that would cause stress or death to

other fish species. The thermocline is worth mentioning here, for example.

In deep mesotrophic and eutrophic waters, the formation of a thermocline during spring reduces the oxygen content—too often, the thermocline has been misconstrued with anglers assuming that there is no oxygen below the thermocline, causing them to only fish higher waters. That happens in spring only. The oxygen content below the thermocline depends on the following factors:

1. We must differentiate according to the trophic state of a water body. Clear oligotrophic waters also form a thermocline in spring and summer, but the oxygen content below is sufficient for fish. As already mentioned, the thermocline in these waters is often only a cold barrier for the fish. The fish that like it warm swim above and those that like it dark and cold below the thermocline.
2. In spring, as the thermocline forms, there is still plenty of oxygen in the lowest layer, the hypolimnion. Only as time passes does the remaining oxygen get gradually consumed. That can happen shortly after the formation of a thermocline but it can also take some time. It depends on how fast the inhabitants of the hypolimnion deplete the oxygen.

4.4.3 What leads to lower oxygen concentrations?

An oxygen deficiency occurs, for example, when the oxygen concentration is reduced. The fish then have less dissolved oxygen at their disposal. Warm water can more easily lead to a lack of oxygen, as the oxygen is less soluble. In cold water, oxygen deficiency is less common.

4.4.4 Plants, algae and photosynthesis

By photosynthesis, underwater plants and most algae (phytoplankton) generally produce more oxygen than they consume during the day. They enrich the water on the shore and in the open water with oxygen. However, as they also consume oxygen, situations may arise where the opposite happens.

In midsummer, the oxygen content in many waters can get scarce. That happens all the more frequently in small, shallow, and warm waters. Oxygen is produced by plants during the day, but not at night. At night, fish, bacteria, and the plants themselves consume the available oxygen. If the ratio of oxygen produced to oxygen consumed is negative overall, the oxygen content steadily decreases. The oxygen availability over the 24-hour rhythm is not balanced. If plants grow rapidly, for example, due to a nutrient abundance in the water, this effect intensifies.

When the sun stands high in summer between seven and eight o‘clock (Central Europe), and the sun‘s rays penetrate deeper into the water, photosynthesis is strong enough to gradually compensate for the lack of oxygen. By noon the activity level among the fish starts to rise again. During the afternoon, many fish use their available energy to feed. Peak activity occurs in the late afternoon before dusk sets in and the oxygen content drops again. At night, all living beings consume oxygen. In waters with a higher trophic level, oxygen consumption is greater than in waters with a lower trophic level.

At dawn, water bodies often have the lowest oxygen concentration.

There is no need to worry, however. Fish have adapted to these circumstances over millions of years and can cope with a partial deficiency. They react and stop feeding almost completely at night. Large fish struggle more with oxygen deficiency than smaller fish. If the water is particularly warm and turbid, some weaker fish may die in the morning. That can happen especially on shallow banks, where plants consume a large proportion of the oxygen. Usually, it is hard for us humans to estimate the oxygen concentration in a water body. However, fish floating belly up are are a clear sign of oxygen scarcity.

Not only the nights lead to this effect. Cloudy and overcast weather can also cause tense conditions for the fish in midsummer. There might not be enough sunlight for photosynthesis. Since more oxygen gets consumed during the day than is produced, a dangerous situation arises for the fish, as they cannot recover. Large-scale fish death can be the result.

Let‘s take a look towards winter. In very cold winters a so-called winterkill can lead to large-scale fish death. If a layer of ice has formed on the water, the light struggles to penetrate. As a result, the algae produce less oxygen. If the ice cover is covered with snow, this effect is all the more dramatic. The dissolved oxygen gets almost completely consumed.

4.4.5 Plants, algae and visibility

Not only larger aquatic plants produce oxygen through photosynthesis, but also floating algae or phytoplankton. They have another significant influence on the oxygen content of a water body because they reduce visibility. If the nutrient input into the water is high, algae bloom may occur. Strong algae bloom can frequently result in partial and sometimes even radical fish death. Nutrients may enter the water because of nearby agriculture. For example, just 2 lbs (1kg) of phosphorus can result in 2,000 lbs (1,000 kg) of algae.

With the increase in algae, visibility can reduce to a few centimetres. In extreme cases, not enough sunlight reaches the depths, so that plants can no longer produce oxygen. The result is a lack of oxygen in the depths. The fish are now forced to surface, sometimes directly below the waterline. Here, they may find enough oxygen or surface to flush a mixture of air and water through their gills.

4.4.6 Bacteria

If nothing stops them, they can and will lead to increased oxygen consumption. As a rule, nature should be in equilibrium, but external influences can severely disturb this equilibrium. If, for example, wastewater enters the water, it causes an explosion of bacteria that feed on the wastewater. These bacteria consume more oxygen than the water body can produce. We know the result from algae.

Even without wastewater, the number of bacteria increases every autumn when the plants die. Just like falling leaves, they sink to the bottom and bacteria begin to decompose them. No more oxygen gets produced, and bacteria consume it dispro-

portionally. If underwater plants grew abundantly, at least the shore area is in parts a danger zone for the fish. They have to leave this area if they can.

4.4.7 Oxygen during the omission of the thermocline in stratified waters

As the turn of autumn replaces the summer stagnation, the oxygen-rich water of the upper layer mixes with the oxygen-poor water of the lower layer. Now, it depends on how much water is present in which layer. As the layers mix, oxygen gets distributed throughout the water, which can cause a lack of oxygen for the fish everywhere. That is one reason why many fish experience great stress during this change. A low oxygen concentration causes a loss of appetite. The duration depends on the size of the water body. Only once acclimated will the fish return to normal activity and start biting again.

4.4.8 Temperature and oxygen in real numbers

That was a lot of text in the last few chapters. Let‘s have a look at some numbers that illustrate the changes in temperature and oxygen in a water body. The following tables reveal at what depths these changes can actually occur. Perhaps, we can structure our understanding more easily this way.

The measurements were taken at a 20ha eutrophic lake. At the deepest point, it measures about 30ft (9m). Therefore, a stable stratification can develop in summer. Researchers took the temperature and oxygen measurements on four different dates throughout the year.

Measurement of March 13th | 11:35 am

Depth	Temperature	Oxygen concentration	Oxygen saturation
1.6 ft (0.5 m)	43.5°F (6.4°C)	0.000112 lbs/gal (13,4 mg/L)	111 %
3.3 ft (1 m)	43.2°F (6.2°C)	0.000112 lbs/gal (13,4 mg/L)	111 %
6.6 ft (2 m)	42.8°F (6.0°C)	0.000115 lbs/gal (13,8 mg/L)	114 %
10 ft (3 m)	42.6°F (5.9°C)	0.000117 lbs/gal (14,0 mg/L)	115 %
13.3 ft (4 m)	42.6°F (5.9°C)	0.000115 lbs/gal (13,8 mg/L)	114 %
16.6 ft (5 m)	No data	No data	No data
20 ft (6 m)	No data	No data	No data

The uniform temperature in the entire water column is clearly visible. The measurements taken in March suggest that the lake is in the middle of the spring turnover. All depths are accessible for the fish. The measurements were taken around midday. Oxygen production by the algae was in full swing. The oxygen concentration is good, and the saturation is above 100%.

At a water temperature of 43°F (6°C), the oxygen concentration is normally 0.0001 lbs/gal (12.4 mg/L) for 100% saturation. However, scientists measured 0.00012 lbs/gal (13.8 mg/L) at a depth of 6.5ft (2m). That results in a saturation of 111%. Hm ...

Remember

Oxygen saturation above 100%? How is that possible?

We can illustrate this quite easily with an example. The water temperature is responsible for the small difference in oxygen saturation. At night the water is cooler than during the day. 13.8 mg/L dissolved oxygen corresponds to a 100% saturation at a water temperature of 36°F (2°C). The March sun can already be pretty warm and produce high daytime temperatures. When the sun warms the water during the day, the oxygen concentration does not change evenly with the temperature. Plants and especially algae produce oxygen faster than they release it into the air. For this reason, the oxygen saturation values are above 100%.

Measurement from June 21st | 12:20pm

Depth	Temperature	Oxygen concentration	Oxygen saturation
1.6 ft (0.5 m)	67.8°F (19.9°C)	0.000117 lbs/gal (14.0 mg/L)	156
3.3 ft (1 m)	67.6°F (19.8°C)	0.000118 lbs/gal (14.1 mg/L)	155 %
6.6 ft (2 m)	67.4°F (19.7°C)	0.000113 lbs/gal (13.6 mg/L)	151 %
10 ft (3 m)	63.0°F (17.2°C)	0.000083 lbs/gal (9.9 mg/L)	105 %
13.3 ft (4 m)	57.4°F (14.1°C)	0.000005 lbs/gal (0.7 mg/L)	5 %
16.6 ft (5 m)	51.3°F (10.7°C)	0.000002 lbs/gal (0.2 mg/L)	2 %
20 ft (6 m)	49.1°F (9.5°C)	0.000002 lbs/gal (0.2 mg/L)	2 %

At the beginning of summer, we can already spot a visible thermal stratification of the lake. The drop in temperature starting at 10ft (3m) illustrates this. A glance at the oxygen values supports the assumption—the values are quite high, above 0.00011 lbs/gal (13 mg/L). However, starting at a depth of 13ft (4m), the oxygen level drops below levels that are sustainable for fish. The thermocline has formed between 10-16ft (3-5m). We can see the summer stagnation clearly.

Remember

What can we deduce from these values for fishing? On the one hand, the oxygen content or oxygen concentration has an elementary influence on how deep the fish can stay. For example, in many smaller lakes or lakes with a high trophic level and tense oxygen conditions, the fish say at a depth of maximum 13ft (4m). From above, of course, we cannot see this.

The answer to this question is so important as it strongly influences our bait selection. We have to decide which bait color is the right one and how deep our bait has to stay. Maybe we need to rephrase the question a little and ask ourselves: „How deep can the fish stay?“

In our table from June, we can see that that on this day and time we should not fish deeper than 13ft (4m). If we are not aware of this phenomenon, we might be fishing at 16ft (5m) depth all day, wondering why we are not getting a bite.

Remember

The sharp drop in temperature in the water column marks for us the summerly thermocline. In waters with a higher trophic level, the area of the thermocline is the deepest region in which our bait can encounter reasonably active pike. We might not be able to detect the range of tense oxygen conditions without professional equipment, but we can still spot the thermocline.

4.4.9 How can we find the depth of the thermocline?

We have the following options:

1. The thermocline is visible with a fish finder. With the correct frequency, it gets displayed as a layer of pixels. That happens because algae and plankton collect in the thermocline. The different density of the water keeps them there or concentrates them. The layer reflects the sound of the fish finder, which is visible on the screen. However, it depends on the right settings. You can find more tips in our book „The Ultimate Fish Finder Guide“—we hope, you can forgive the short advertisement. ;)
2. The second alternative is to measure the temperature. You can lower a depth thermometer (Saenger‘s AnacondA Fish Hawk GTM) into the depth and record the temperature. Once you pull the thermometer up again, you can see the temperature at each respective depth.

The second method of determining the thermocline is more exact because we can reliably measure the temperature drop.

Measurement from August 21st | 07:45am

Depth	Temperature	Oxygen concentration	Oxygen saturation
1.6 ft (0.5 m)	74.8°F (23,8°C)	0.000078 lbs/gal (9,3 mg/L)	111 %
3.3 ft (1 m)	74.8°F (23,8°C)	0.000073 lbs/gal (8,8 mg/L)	104 %
6.6 ft (2 m)	75.0°F (23,9°C)	0.000072 lbs/gal (8,7 mg/L)	103 %
10 ft (3 m)	73.9°F (23,3°C)	0.000066 lbs/gal (7,9 mg/L)	92 %
13.3 ft (4 m)	67.8°F (19,9°C)	0.000020 (lbs/gal 2,4 mg/L)	28 %
16.6 ft (5 m)	55.9°F (13,3°C)	0.000002 lbs/gal (0,2 mg/L)	2 %
20 ft (6 m)	52.2°F (11,2°C)	0.000002 lbs/gal (0,2 mg/L)	2 %

Midsummer caused the temperatures in the lake to rise. The water temperature invites many people to swim. For the fish, however, these temperatures bring a lot of stress. We can see that the temperature stays above 73°F (23° C) until a depth of 13ft (4m). Starting at 13ft (4m), it gets cooler with 67.8°F (19.9°C). Are the fish staying in this zone that is optimal for them? No, they cannot. The oxygen concentration is too low. For a short time, however, some fish will go to the 13ft (4m) depth to cool down.

Remember

The fish are forced to stay above 10-13ft (3-4m). If you fish in this area below the 13 feet (4 meters), your bait will be quite lonely. However, this constellation has one advantage: The combination of high water temperature and a good oxygen concentration of 8-9 mg/L makes the fish very active. Small and medium-sized pike now feed more often because they digest quickly.

Measurement from November 4th | 11:00am

Depth	Temperature	Oxygen concentration	Oxygen saturation
1.6 ft (0.5 m)	43.0°F (6,1°C)	0.000076 lbs/gal (9,1 mg/L)	76 %
3.3 ft (1 m)	43.0°F (6,1°C	0.000076 lbs/gal (9,1 mg/L)	76 %
6.6 ft (2 m)	43.0°F (6,1°C)	0.000076 lbs/gal (9,1 mg/L)	76 %
10 ft (3 m)	43.0°F (6,1°C)	0.000076 lbs/gal (9,1 mg/L)	76 %
13.3 ft (4 m)	43.0°F (6,1°C)	0.000076 lbs/gal (9,1 mg/L)	76 %
16.6 ft (5 m)	43.0°F (6,1°C)	0.000076 lbs/gal (9,1 mg/L)	76 %
20 ft (6 m)	43.0°F (6,1°C)	0.000076 lbs/gal (9,1 mg/L)	76 %

The autumn change in the water has long passed. The whole lake is now accessible for the fish. The winter is still far away, making it difficult for us to locate hotspots based on temperature and oxygen concentration. Many fish are now headed towards their winter quarters, for example, deep bottom holes.

Remember

First of all, we must state that the measured values in the tables only apply to this respective lake, meaning they do not apply to all water bodies. In our example, we are dealing with a small, deep eutrophic lake. The lake is stratified and forms a thermocline in summer.

The low oxygen concentration below the thermocline can be dangerous for fish. However, we can still find prey and pike below the thermocline from time to time. Prey fish might seek protection from predators below the thermocline. The fish can endure the lack of oxygen for several minutes. The pike follow their prey and can cope well with low oxygen concentrations. Of course, that applies only to short periods of time.

In general, we can say that if we know the trophic level of a water body, we can deduce possible oxygen deficiencies. Compared to mesotrophic or oligotrophic waters, eutrophic and polytrophic waters deplete oxygen a lot faster. Underwater vegetation is abundant in these water. Also, they are often shallow and have warm water in midsummer.

It is important to note that oxygen deficiencies can also arise without a thermocline present. Although the water temperature is almost constant throughout the water column, shallow, unstratified waters with a high trophic level, for example, strongly eutrophic or polytrophic, can also have low oxygen concentrations, potentially even at low depths in midsummer.

At critical oxygen levels, fish must react and adapt their behavior. On the one hand, they can reduce their metabolism or look for a new site. Fish eat more with increasing oxygen concentration and reduce food intake with decreasing oxygen concentration.

4.5 Visibility

Since the pike is a visual predator, visibility has a big influence on its hunting behavior. To put it another way: Visibility influences the pike‘s hunting strategy and success rate. We will learn later what are the exceptions to this rule.

However, not only the pike but also its prey is affected. It adapts its habits as the visibility underwater changes. That is easy for us to comprehend, for we visually orientate ourselves, too. The more we see, the better we feel. It is easy to imagine what it would be like to walk down a barely illuminated alley or a remote forest path at night. Depending on how familiar we are with the area, we will experience a feeling of discomfort. Our senses become sharper. We try to grasp things in the darkness. Even small noises irritate us. Our adrenaline level rises, and we are on guard for a possible attack. We feel entirely different if we follow the same path during the day.

Fish experience something similar. If the visibility is high, predators are easy to detect. When visibility drops to a few inches / centimeters, fish rely on other senses than just their eyes. Then, their survival depends, for example, on their lateral line organ, sense of smell, and increased reflexes.

Visibility in water bodies

trophy status	small lakes	unstratified lakes	stratified lakes
oligotrophic	-	-	16 – 48 ft (5 – 15 m)
mesotrophic	6.6 – 10 ft (2 – 3 m)	6.6 –11.5 ft (2 – 3.5 m)	8 – 16 ft (2.5 – 5 m)
eutrophic 1	3.3 – 6.6 ft (1 – 2 m)	5 – 6.6 ft (1.5 – 2 m)	5 – 6.6 ft (1.5 – 2 m)
eutrophic 2	2.5 – 4 ft (0.8 – 1.2 m)	2.5 – 4.3 ft (0.8 – 1.2 m)	3.3 – 5 ft (1 – 1.5 m)
polytrophic 1	1.6 – 2.3 ft (0.5 – 0.7 m)	1.6 – 2.6 ft (0.5 – 0.8 m)	2 – 3 ft (0.6 – 0.9 m)
polytrophic 2	0.7 – 1.6 ft (0.2 – 0.5 m)	1 – 1.6 ft (0.3 – 0.5 m)	1.3 – 2 ft (0.4 – 0.6 m)

4.5.1 The watercolor

Now it gets interesting: the color of water influences the behavior of pike and thus our fishing. We know that turbid and clear water mean great differences for life under water. But what about greenish or brownish water? All right, let‘s start from the basics and work our way up.

What causes the differences in color and visibility?

When hunting for pike, we have to appreciate differences in water color and visibility. One water is clear, the other greenish or brownish. The more nutritious a water body,

the cloudier it is. Nutrients promote algae and phytoplankton growth, making the water greenish. That process occurs most frequently during summers, yet may arise at any time throughout the year. Should algae bloom during summer, the process reverses during the following months, leaving behind noticeably clearer waters in autumn.

Visibility, to a large degree, is independent of coloring. Thus, it is not uncommon to find brownish/greenish waters at both 6 feet (2 meters) or 8 inch (20 centimeters) visibility. It is eutrophication—excessive richness of nutrients in a lake or other water body—we must turn towards to identify the driver of visibility.

Some lakes have a brownish color due to dissolved humus. Other lakes have a yellowish color due to dissolved clay. If the lake is ‚nested' with many bays, it can even happen that the individual sections differ from each other. The color of the water absorbs the individual colors or wavelengths of the light to varying degrees. Brown water, for example, absorbs light very strongly in the blue and UV spectrum. As a result, the same objects may appear in different contrasts.

Remember

The blue of a bait looks paler in brown water than in green water. Experienced pike anglers adjust their bait choice to the visibility, but only a few account for the water color.

The color of a water body can also change. If the phytoplankton dies, it sinks to the ground and bacteria begin their work. They decompose the algae and consume the last remaining oxygen. The process often occurs in autumn. The water changes color from green (living algae) to grey (dead algae). Most fish move from the grey water. Fishing greener parts promises better odds.

4.5.2 Hunting at different visibility and water colors

The location influences the hunting conditions. If the water body is polytrophic, visibility is often restricted to only a few inches / centimeters. The low visibility, diminish the odds for the predator. Consequently, it is possible that the pike ends up expending more energy to hunt than it takes in through its prey.

The pike stock in these waters can gradually decline if humans do not artificially increase it. A good example here is the Große Müggelsee near Berlin, which has become murky since it started to eutrophy in the 1960s. Wastewater and agriculture caused a high nutrient content which in turn led to the complete death of the underwater vegetation. For years, the water was so turbid that there was no clear water period at all. Only since the end of the 90s, have researchers witnessed short clear water periods again. A few underwater plants have been able to recapture a small part of the lake. A small fish population has established itself.

If a water body is meso- or oligotrophic, the visibility is over 6.5ft (2m). In these condi-

tions, the pike can see and hunt well. Since to succeed it requires good visibility and camouflage, it finds optimal hunting conditions in clear waters at dusk. It can lurk near hiding spots, and its sight is good for attacks at short distances. Its instincts calculate the success of an attack.

Remember, hunting involves several steps. A prey must first grab the pike‘s attention. The prey should appear to be easy in order for the pike to launch an attack.

Reaction distance

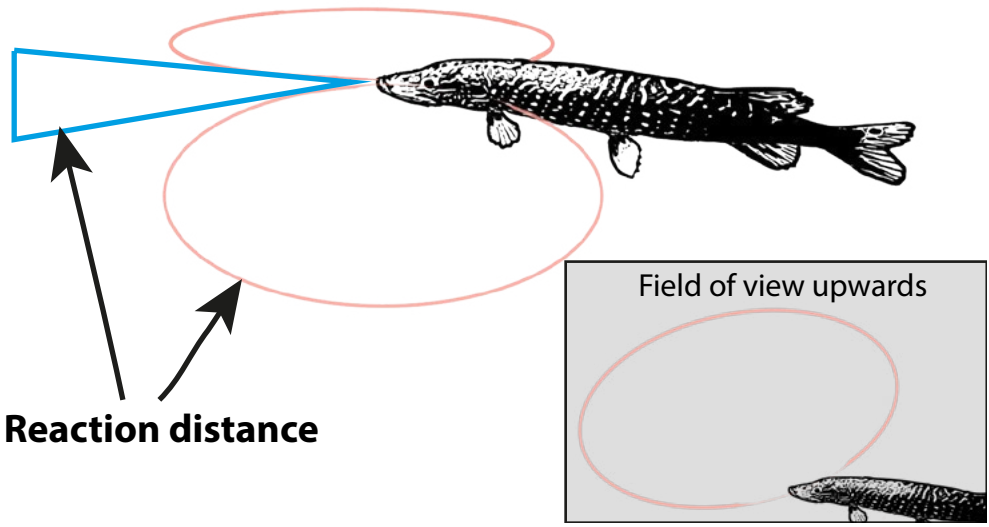


Figure 4.10—Horizontal and vertical reaction distance

In principle, we want to know when the pike becomes aware of our bait—when does it react to a prey? We can assume the following:

- With visibility below 3ft (1m), the preferred distance is always slightly above the respective visibility (example: visibility 24“ (60cm) | distance to prey approx. 28“ (70cm))
- With a visibility above 3ft (1m), the preferred distance is always slightly below the respective visibility (example: visibility 6ft (2m) | distance to prey approx. 4.5ft (1.5m))

Remember

The visibility has an influence on when the pike reacts to nearby prey. However, being interested does not equal a desire to attack. Only if there is a realistic chance for the pike to catch its prey, will it launch an attack.

Studies have shown that 4.5ft (1.5m) appears to be the maximum distance at which the pike reacts to a prey. At distances above, pike will react only seldom.

That means we have to get very close to the pike with our bait to grab its attention. Depending on the particular pike‘s preferred prey, we might have to get even closer. Always account for the horizontal and vertical distance from the pike to your bait.

Note:

In the next few lines, we refer only to roaches, as this information comes from experiments on roaches. We are confident that these findings apply more or less to other fish species as well. However, we do not want to guess numbers for other fish and certainly do not want to speculate.

Strike distance

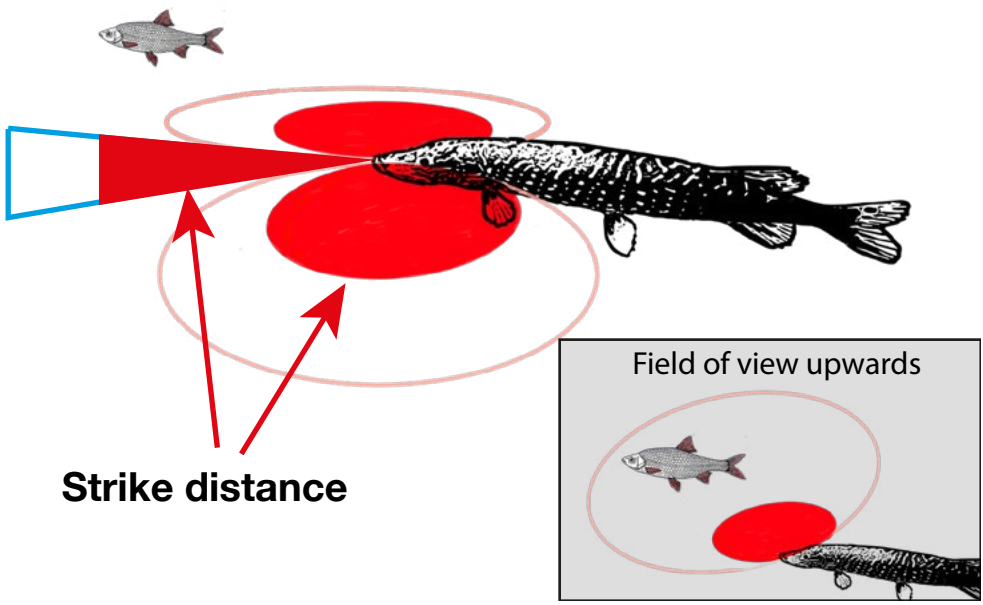


Figure 4.11—Horizontal and vertical strike distance

The strike distance of the pike is less determined by the visibility than one might assume. Due to its lateral lines, it is able to locate even the smallest movements in the water. The instincts of the pike help it to estimate the probability that the prey will flee during an attack. In most situations, the strike distance for fast roaches will never be more than the pike‘s own body length. If we have a 28“ (70cm) pike targeting our roach bait, it is most likely to attack if it is within this attack zone.

This distance is the maximum distance between roach and pike for a successful attack. Whether the visibility is 6ft (2m), 3ft (1m) or 10“ (25cm) does not matter. Rather, we assume that the escape reaction and speed of the prey play a greater role in deter-

mining the strike distance.

We can assume that a pike attack is more likely the closer the pike and roach are to each other. A distance of half a pike‘s body length should promise success. For a 28“ (70cm) pike that means a 14“ (35cm) distance. Yes, that is quite close to the pike.

Smelling and Spying

The pike does not only perceive its prey visually. Its sense of smell also guides it to locate its prey. We can even measure the impact of the sense of smell on the perception. Researchers studied pike and their prey in a basin to see whether pike perceive prey differently when it is under a transparent container—the pike could see the prey but not smell it.

The pike reacted to prey under the containers much later than to prey swimming freely in the basin. For the pike to notice prey behind a glass container, it had to be 40% closer. Researchers concluded that the lack of pheromones accounted for this effect—the pike were not able to smell the prey.

The experiments revealed that a mere optical stimulus activates the pike much later. For our baits, that means that we have to get even closer to the pike.

Money saving tip

If you think of various tinctures as a solution, you better save your money. Even if one or the other supplier may not like to hear this, pheromones are the decisive factor, and not some bait soup in nicely packed bottles that stink.

As far as we know, there is currently nothing on the market that contains pheromones. In the end, we only have other pike senses to appeal to. Rattles and vibrations caused by the bait movement itself will help to catch the pike‘s attention. However, we do not yet know how strong these effects are. It is a fact, however, that the design of bait a can be supported in order to cause further pike stimuli.

Nevertheless, the sense of smell is important and helps the pike to hunt. It can be the final factor that initiates the pike‘s attack. Unfortunately, the artificial baits lack the necessary authenticity. Very often pike will only observe our baits extensively without biting: „It looks like a fish, moves like a fish but does not smell like a fish.“

Escape distance

We must consider the escape distance a little more closely since each prey species has different preferences and/or corresponding defense behaviors. Roaches are very attentive and flee earlier than other fish. We already know that.

Visibility at approximately 3ft (1m)

In clear water, the roaches flee at a distance of 3ft (1m). Roaches are very aware of the pike‘s attack speed. As we discovered in our book „Finding Fish – The Smart Way – The Zander,“ the escape distance of the roaches to the zander is only about 1.3ft (0.40 m).

Back to the pike. Due to the early escape of the roaches, the pike rarely tries to hunt them if they are more than 3ft (1m) away.

Visibility at approximately 10“ (25cm)

At visibility of 6-8“ (15-20cm), the escape-distance of the roaches is within 10“ (25cm). Roaches rely on their lateral line organ in low visibilities to spy predators. The escape-distance of the roaches is bigger than the visibility—bigger than 10“ (25cm). Their lateral line organ now plays an important role in assessing the situation and often encourages the roaches to flee before they can actually see the predator. With the pike, the attack-distance lies below the actual visibility—under 10“ (25cm). In this respect, the roaches have an advantage. It becomes more difficult for the pike to hunt roaches so that it either has to exert itself or spy on other prey.

By the way, these values are almost identical in yellowish or greenish water. However, there is a big difference in brownish water with low visibility. Here, the pike can approach the roaches up to 2-3“ (5-8cm). That is dangerously close making the roaches easy prey. It seems that pike are well camouflaged in brownish water, allowing them to hunt effectively without getting spotted. It would be exciting to know whether pike are aware of this advantage.

We already know from our book on the zander that roaches are easier prey in murky water, as their swarm defense strategy is less effective. In brownish water, this effect seems to increase.

Remember

Pike have an easier time hunting roaches in brownish water rather than in greenish or yellowish water. In these waters, not only is the escape distance shorter than in other environments, but it is shorter than the optimal strike distance of the pike. As a result, pike likely can hunt more successfully without much effort. Roach baits should be a good choice if we reel them slowly. However, you will still have to get close to the pike, which will require a few casts. A mobile depth sounder can shorten the search by focusing on large fish crescents.

In general, when visibility is good, feeding time gets moved to when the hunting conditions for the pike improve, meaning the visibility worsens. Various studies have shown that the feeding activity of pike is higher when light decreases (dusk) than when light increases (dawn).

4.6 Wind

The wind influences life underwater. However, the extent to which individual waters are directly affected depends on their respective structure or profile. We have to distinguish between different standing waters, such as shallow or deep lakes and large or small lakes. The depth, for example, determines whether a stratification builds up in the water body. The size of the water surface, on the other hand, influences how well

the wind can mix the water.

We have already seen that different living conditions for the fish can exist at different water depths. When the wind creates waves and the water moves, the water mixes. The impact of the wind varies depending on the water body's size, shore, and profile.

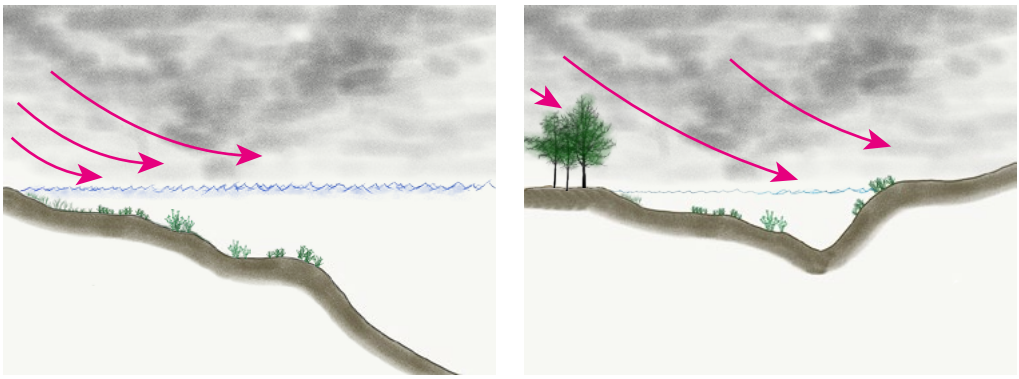


Figure 4.12—Wind and waves on water surfaces of different sizes

Small waters or bays surrounded by trees, houses or mountains are much less susceptible to wind. The wind is slowed down beforehand by the obstacles and hits the small water surface with less force. It does not manage to move the water masses so that the layers within the water column remain stable. If the water surface is large—above 10 hectares, obstacles on the shore play a smaller role. The wind hits the surface area with all its force.

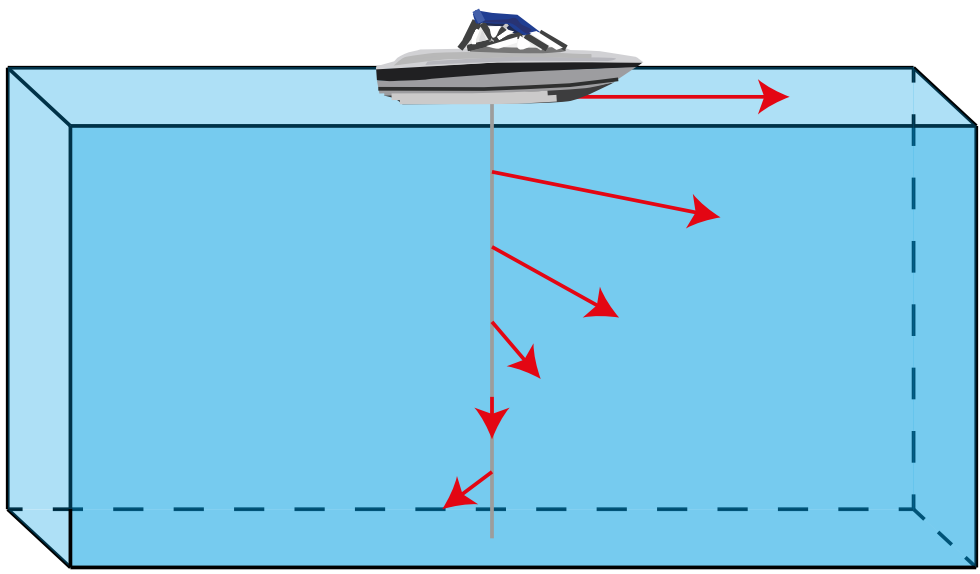


Figure 4.13—Coriolis force

Friction between wind and water surface creates waves. The water starts to move,

and a current emerges. The uppermost layer of water pulls the layer underneath with it, which in turn pulls the next layer with it, and so on. The Coriolis force causes this effect. The water does not steadily flow in the same direction, but the direction changes, for example, in stagnant waters with increasing depth the water moves further and further to the right (northern hemisphere). In flowing waters, the water also rotates, so that it begins to hit the shore, where it gets deflected again. We can detect the effects of the Coriolis force in rivers by the resulting slip-off slopes. The principle has its cause in the rotation of the earth.

Depending on how the waves hit the shore, the water flows back in the opposite direction. It gets well mixed. If we have a wind speed of approx. 4mph (7 km/h), the wind can pull water at a depth of up to 3-6ft (1-2 m). At 11mph (18 km/h), the moving water mass might be 13-23ft (4-7m) deep, at 22mph (36 km/h) even 20-40ft (6-12 m).

In autumn, winter, and spring, the wind can penetrate deeper into the water. The moving water mass is much thicker than in summer. We know the reason: Cooler water mixes better so that the individual water layers mix more easily. In summer, the thermal stratification is more stable, and the wind must be quite strong for the warm water layers to mix and move. For this reason, there is rarely a high wave in summer.

In addition to the wind speed, the wind direction and the structure of the water body also impact the moving water masses. Humps divert the flowing water and slow it down. Bays are spared from winds and offer protection. Warm water gets pushed around by the currents, bringing its inhabitants with it.

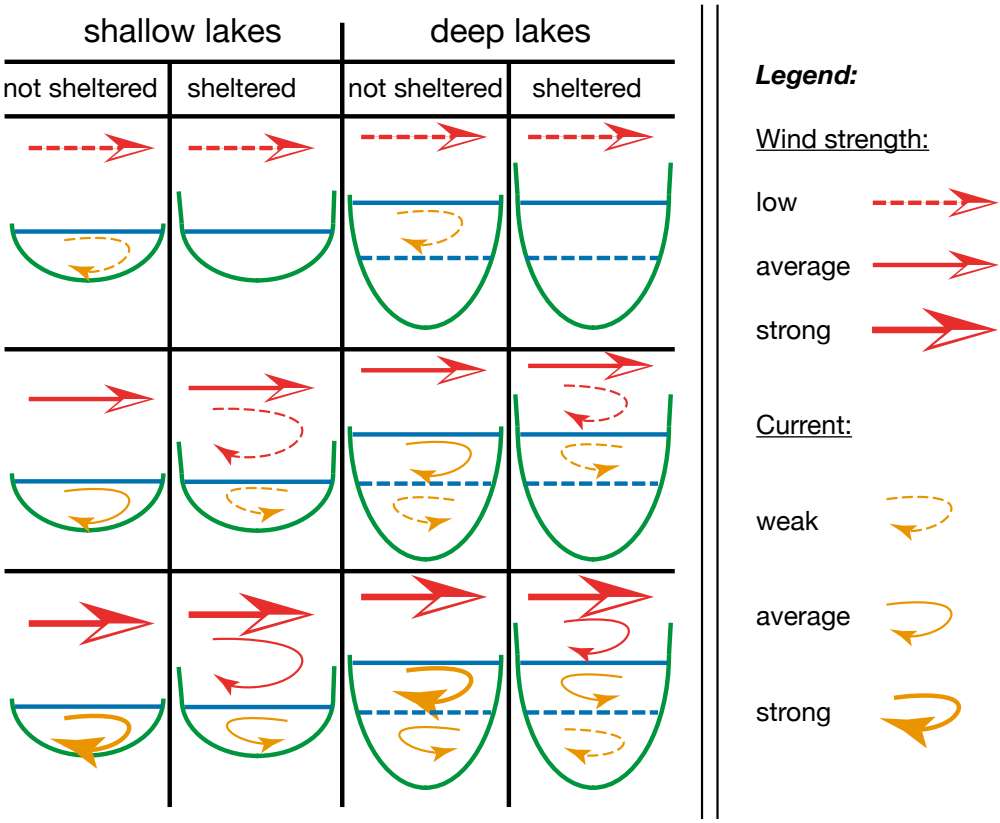


Figure 4.14—Wind

SWe can nicely spot the effects of the wind on the movement of the water masses. Protected lakes are less affected by the wind.

4.6.1 Storm

If the water is deep and a stable thermocline has formed, the thermocline protects the below water from the movements above. A strong wind can only reach the thermocline. However, rare, violent summer storms can tear down the stratification of a water body. An extraordinary situation arises: The oxygen-poor water mixes with the oxygen-rich water. Everything rolls and is in motion. The oxygen concentration drops overall so that the fish have to adjust to this new situation. If this occurs after a summer storm, chaos erupts. Hunger, biting times and hotspots change. It takes 2-6 weeks for life underwater to return to normal.

4.6.2 How to detect upcoming winds?

Different air pressure distributions cause wind. The wind movement gets directed from the high-pressure area into the low-pressure area until the air pressure of both areas is balanced. We can spot an upcoming breeze with the help of a barometer or a wind app. In general, we can assume that wind occurs whenever the air pressure changes

by around 3-6hPa within three hours. The stronger the wind, the greater the change in air pressure. It can fall or rise.

If the air pressure falls, more or less heavy rainfall may occur. If the air pressure rises, however, we can expect dry weather. Rapid changes above 6hPa in under three hours indicate a storm—it does not matter whether the air pressure is falling or rising.

The direction of the wind can give us an indication of how the weather will change. We can use the following tables to plan our fishing trip.

Environmental conditions – wind direction and rising barometer

Wind	Spring	Summer	Autumn	Winter
N	Mainly dry, but cold weather. Night frost	Cold & dry except near the east coast	The first autumn frost is not far away; dry, sunny-cold weather in the southwest	Snow showers decrease, followed by hard frost
NE	Cold, cloudy weather with sunshine on the west coast	Cold & cloudy in the southeast, but beautiful and sunny in the west & northwest	Fair weather period, except near east coast	Thunderstorm period in the north and interior of the country
E	Same as NE, but more consistent	Fair weather period, later with rain from the south	Same as NE	Cold or very cold, dry weather with a high probability of snowfall
SE	Fair weather period, very mild	Two, three days nice warm weather, later thunderstorm	Indian summer	Same as E, especially hard in late winter. Ongoing fog in the interior of the country
S	Short warm period of fair weather	Short, very warm, fair weather period	Indian summer, less resistant	Dense, persistent fog in the interior of the country
SW	Good, steady weather. Mild and mainly dry.	Warm period of fair weather, little rain, drizzle on the west coast and mountains	Coastal and mountain fog in the west, but beautiful and mild inland	Short mild, cloudy weather period, lots of mountain fog
W	Same as SW	Same as SW	Temporary beautiful, mild weather period	Same as SW
NW	Decreasing rain showers. Short cooling, dry period.	As in spring, but cold (for summer time)	Temporary cooling with sporadic showers	Shower or hailstorm with decreasing frequency

Environmental conditions – wind direction and falling barometer

Wind	Spring	Summer	Autumn	Winter
N	Snow / sleet showers, possibly thunderstorms	Cold, thundery weather with hail	Shower, followed by night frosts.	Snow or snow showers, very strong on mountainous land
NE	Rain in the east, dry in the west	As in spring	Little changeable	Snow in the eastern areas, but not much
E	Same as NE	Same as NE	Same as NE	Thaw, possibly snow beforehand
SE	Rain is approaching the southwestern areas	Thunderstorms	Rain in the south, locally very productive	Lots of snow in the southeast
S	Immediate impending rain	Rain and possibly thunderstorms	Imminent rain, probably heavy and persistent	As autumn, very mild
SW	Immediate impending rain	Immediate impending rain	Rain & Storms	As autumn, mild
W	Rain or showers	As in spring	Rain or shudder. Persistent, mild weather	As autumn
NW	Shower & colder weather with hail and thunderstorms	As in spring	Eerie weather, hail or thunderstorm risk. Cool	Heavy snow or sleet showers. Hail or thunderstorm risk

Remember

The wind has a decisive influence on life under water. It promotes or inhibits certain behavior of fish. For example, it can decisively impact the feeding behaviors and habitats of prey fish and predators.

4.6.3 The best weather for pike fishing

Winds often aid our fishing. However, if you go to the same pike hotspots in windy weather as in sunshine, you might end up heading home disappointed. The wind has a strong effect on the pike habitat.

We regularly read that stormy days are ideal for pike fishing. However, do not accept this claim blindly. Whether a stormy day is good for pike fishing depends on the wind. For deep stratified waters, we can accept the statement. But there are exceptions. In unstratified, shallow, eutrophic or polytrophic lakes, we have to account for potential oxygen scarcity as described above.

For example, after particularly hot days in larger shallow waters, the fish might stop feeding altogether. The cause is often strong winds produced by cooling temperatures. If those storms sweep across shallow waters, mixing the entire water column, the result can be a lack of oxygen. Mixing well-oxygenated water at the surface with non-oxygenated water near the bottom often results in poorly oxygenated water. Depending on how the wind interacts with the water, it can lead to a sudden lack of oxygen for the fish.

Only as the oxygen content rises again by sufficient photosynthesis does the behavior of the fish normalize. What do we mean by sufficient photosynthesis? Sufficient means that the plants have to produce an excess of oxygen. The solar radiation after the wind plays a big role in the regard.

Remember

- If it remains cloudy, the shallow water recovers more slowly than if sunny weather follows the wind.
- If the sun shines strongly after the wind, the oxygen concentration should return to normal within a day or two. The fish bite again and make up for the 1-2 day fasting period.
- If it is still cloudy for a few days after the strong wind, the recovery will take longer. Feeding stops for a few days, however, returns violently, as the high water temperatures keep the fish‘s nutrient consumption high—fish have to feed more in warmer water. If fish have to starve for a few days, they catch up as soon as the opportunity arises.

4.6.4 Wind, pike, and the shore

Pike may love shallow water, but on windy days they retreat to the outer edges of their territories. The wind creates waves, and near the shore, the water quickly becomes turbid due to the swirling sediment. On top of that, clouds darken the ambient light in the water. Scientists assume that these circumstances cause visual predators like the pike to leave the turbid water to hunt more effectively elsewhere.

Larger pike above 24“ (60cm) in length tend to leave the shallow water to move towards the deep drop-offs. However, the pike do not necessarily change their preferred depth and will stay at around 13ft (4m). From their floating position, they can hunt towards the underwater vegetation.

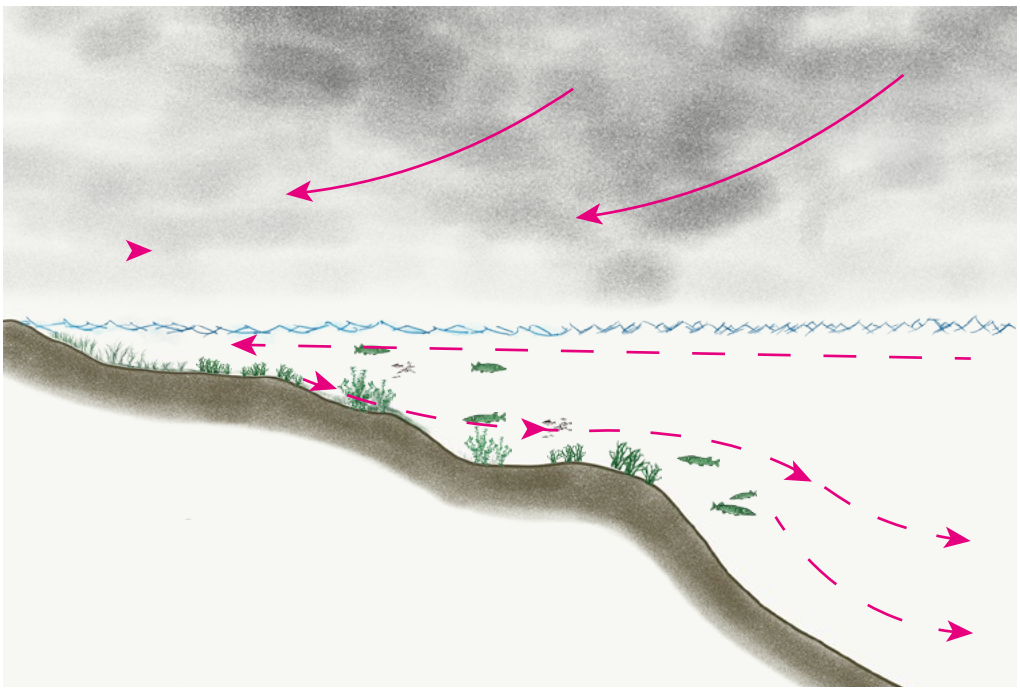


Figure 4.15—Current from the open water

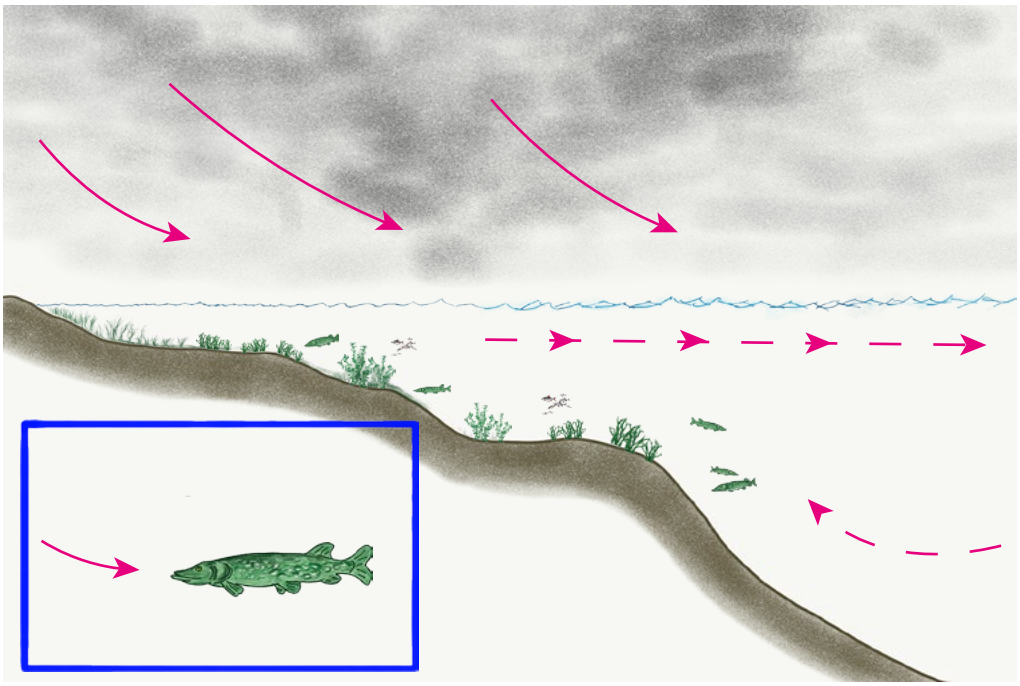


Figure 4.16—Current from the shore

4.7 Clouds

On particularly hot days, clouds can cause a sudden lack of oxygen if the plant growth near the shore is very strong—clouds reduce the solar radiation, and the sunrays cannot penetrate the dense vegetation to reach the depths. The plants consume all the oxygen. Now, the fish have to leave their hiding spots to escape suffocation. Many pike will venture out, either towards the deep water near the edges or close to the surface. The prey fish have to move as well and are now without cover. The feeding can begin.

Remember

There is no „best pike fishing weather." Your success will vary from season to season and also from water body to water body. At the end of winter, clear sunny days promise a lot of success. During the warm season, with water temperatures above 68°F (20°C), the opposite applies. On clear sunny days and in clear water, pike hunt less. Their camouflage is not as effective, so they save their energy for hunting in the morning or in the evening.

If the weather is cloudy and overcast, your odds improve. That is all the more true in clear waters. It becomes noticeably darker underwater, making it very difficult for the prey to spot the pike. A change of weather from sunny to cloudy could be the start of

a great fishing trip because suddenly the water gets darker—you still have to account for the water temperature and the season. If the wind is strong, it depends on the water and the season whether the fish will be biting.

In strong winds, your own safety should take precedence. That is especially true for the boaters among us!

Well, as with other statements, we have to put the assumptions about wind and weather first into context. These environmental influences have different effects in different waters at different times of the year. Also, pike may portray quite different behaviors from one another. If the pike is hungry or has to defend its territory, you may be able to witness spontaneous attacks on beautiful sunny days.

4.8 Summary of environmental influences

Let‘s briefly recall biotic and abiotic factors (see chapter 4.1 „The environment and various influences“ on page 64). We must not perceive the environmental influences in isolation. They never occur alone and in their combination have a strong impact on the life underwater. For this reason, we have to study all environmental influences in tandem. You could start learning more about the water body that you regularly fish. That will be quite a challenge in itself.

For example, an increase in water temperature has a concrete impact on plant growth and fish stocks. The increase can have a positive or negative impact on prey numbers and force pike to change their behavior. Do not try to study in detail every minute aspect. Not only would this be a tedious endeavor, but we would question the success of such an approach as we can never know all the factors.

If we manage to observe the water, the plants and the soil structure a little more attentively than usual; if we manage to connect our own catches and those of other anglers with the respective weather, then our awareness of these interrelations should improve.

That is how we develop a fundamental understanding of the relationship between prey and predator and the effects of climatic changes on their habitat. It would be a nice goal for us anglers if we could not only instinctively put on warmer clothes during a cold spell but also intuitively identify the right hotspots—imagine being able to confidently predict the best hotspots given the season and respective climatic conditions at the start of your fishing trip. Our knowledge will hopefully become intuitive at some point with continuous application and expansion. Once we have done this, pike fishing will become even more fun, and we will be able to give the offspring a lot more tips on their way.

We have already learned and processed quite a lot in the last few chapters. In the following chapter, we place all the information into context. We will discover the habitat of the pike and review a typical year in its life. In the end, hopefully, we all can confidently locate the best hotspots for pike fishing.

Chapter 5

Habitats

We know a great deal about the habitats of pike. Intensive research has been carried out on the subject since the 1950s. Some long-term studies were carried out over many years. For example, one study investigated the effects of a changing water level on the pike‘s growth. The study lasted from 1971 to 1992. That is 22 years. Overall, researchers obtained very detailed results on the different growth rates of pike. Of course, the results of individual studies should always be considered with a healthy dose of objectivity, as they are almost always habitat-specific. Many different studies illustrate nicely how pike interact with different habitats, what the habitats have in common and what distinguishes them.

5.1 Vegetation

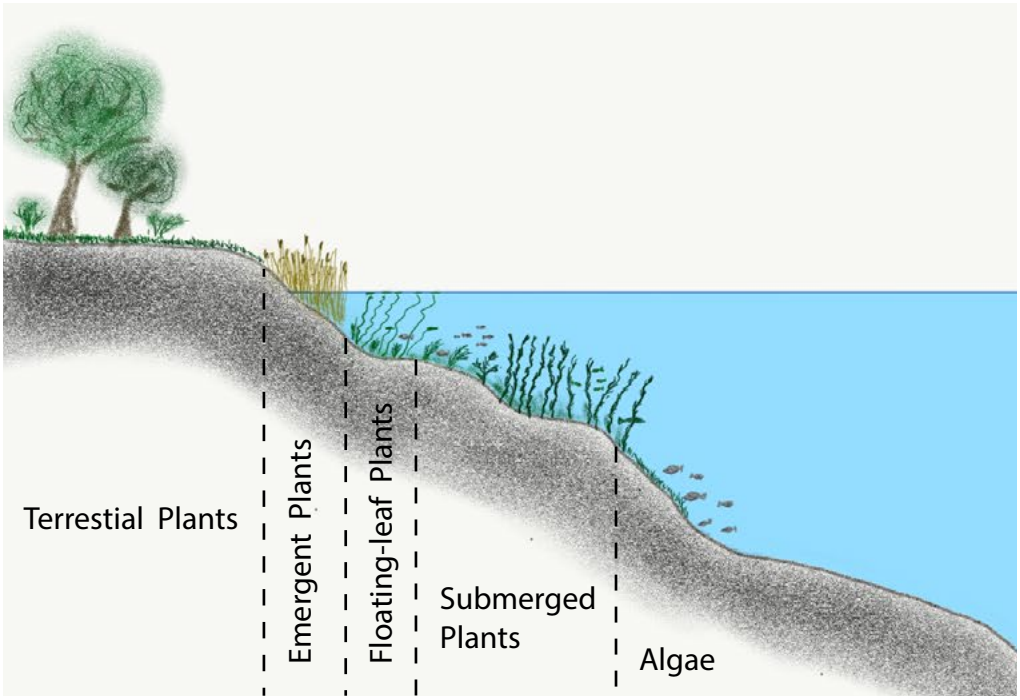


Figure 5.1—Vegetation zone

Vegetation is the anchor point of a pike‘s life. It needs vegetation to survive as well as oxygen to breathe. Healthy vegetation is fundamental to a good and healthy pike population. Without vegetation, there would be none. From the spawn on, which is deposited on underwater plants, the vegetation forms the basis of the life of the young pike. They can hide between the plants from predators and stalk their own prey. The lurking behavior solidifies with increasing age and expresses itself in the „sit and wait“ tactic—pike use their natural camouflage between plants to wait motionless for prey to swim past and then strike at the right moment.

Most pike in a water body stay in close proximity to the overgrown watercourse-sections. Smaller pike live in very dense vegetation. On the other hand, the adult pike like some open spaces between the aquatic plants. The largest predators we often find

either in sparsely overgrown habitats or, depending on the water, in open water. That of course depends on whether the depth and structure of the lake offer open water at all.

Let‘s emphasize this point: If you are fishing for pike, look for vegetation. Without sufficient vegetation, it is highly probable that there will be none or only a few pike at the spot. Those who know the structures and vegetation of their waters can improve their odds significantly.

The density of the underwater vegetation correlates strongly with the size of the pike. Small pike prefer dense vegetation such as reeds and rushes. Larger pike actively look for sites where they have enough space to maneuver and hunt.

Pike occupy various habitats in their waters. Some habitats offer good living conditions, others less. Larger pike will occupy the best spots for their age group.

The question arises, what defines a good hotspot?

The following chapters will provide many answers to this question. A short and general answer could sound like this: A good hotspot for pike has optimal vegetation relative to the pike‘s size, offering protection, cover, and prey.

Since pike live in constant danger, they must grow to survive. Only once the pike reaches a certain size which makes it too big as prey for other predators, will it leave the protection of the underwater vegetation more or less permanently.

When looking for the best hotspots, we should always ask ourselves the following questions:

- What does the underwater vegetation look like?
- At what time will the pike be active on the hunt?
- What depth do adult pike prefer here and now?
- How far from the shore do they stay?
- Which prey is most abundant? Where and when?

We face the challenge of evaluating the habitat of pike, recognizing the effects of underwater vegetation and how it evolves over the course of a year.

5.1.1 Not all vegetation is created equal

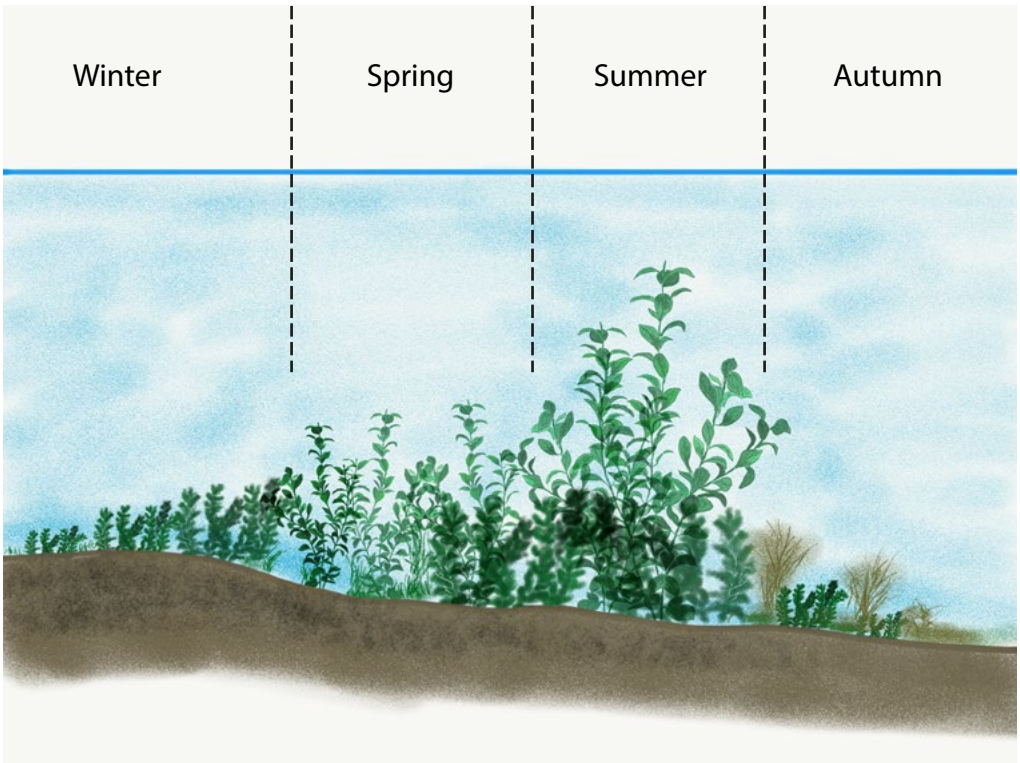


Figure 5.2—Annual cycle of underwater plants

The various underwater plants do not always provide the same living conditions for pike. Plants are also living creatures and develop differently. For this reason, they also have a differentiated effect on the pike. In dense vegetation, we will rarely find large pike. In the winter months, this becomes particularly clear. Some underwater plants die almost completely in late summer and autumn. These only provide a habitat for pike during the warm months. Other plants retreat during the colder months of the year but still cover the bottom of the water. They offer protection and cover to the pike even in winter, only deeper.

Also the density of the plants different depending on the species. In summer, the Hydrilla can form an impenetrable area with sprouts up to 25 feet (eight meters) long. Small pike and many prey fish find a perfect habitat here. Large pike are denied access. Many of them cannot hunt effectively. Other plants are much more suitable for them.

The seasonal changes ensure that the fish of the different species get distributed throughout the year. When plants grow, they attract fish. If they die, the fish move on again. We have to react to these seasonal changes, and cannot just stubbornly fish the same spot all year round. Of course, we might be able to land a pike or two but most of the time we will go home empty-handed. We overgeneralize all too often. If we catch a big pike on a specific edge in spring, we tend to think we have found the ultimate

hotspot in our waters, and head for it the entire year. Here is another example: Most anglers likely have one or two favorite baits. If we catch one, two or even three pike with one bait, we proclaim it to be the best pike bait in the world in no time. We might be right, however, only at a certain time or place. To sum it all up in one sentence: the answer is not always black or white, sometimes it is grey.

5.1.2 Whoever finds the prey finds the pike

Most prey fish of the pike are small and live in constant danger. They need protection, and they find it in the vegetation. The denser and more extensive the vegetation, the more prey fish there are. That, in turn, attracts many predators, including pike. Within the vegetation, the fish population is up to seven times higher than outside.

The structure of the water body has a significant influence on the distribution of underwater vegetation. Shallow waters often have wide and sweeping shallow water zones with abundant vegetation. In deep waters, the edge of the shore often drops sharply due to the deep basins. For this reason, shore zones are often much narrower than in shallow waters.

5.1.3 How much vegetation should there be?

Pike of catchable size, seek less vegetation because large pike must have a clear path for their attack. If the vegetation is too thick, the pike cannot accelerate enough to attack. The escape speed of the smaller prey, on the other hand, is hardly affected. So we have to find the optimal vegetation to find the pike.

5.1.4 Search for vegetation

Observations, records, and notes from previous years are helpful. If we have previously spotted a field of water lilies, we can assume that it will be in the same spot again this year. Unfortunately, it takes some time for us to spot the water lilies as they first have to work their way to the surface. In general, observations of greater depths are impractical, as underwater plants are difficult or even impossible to spot from above. Murky water makes this challenge all the more difficult due to the low visibility.

5.2 Fish finder

With the help of fish finders, we can spot vegetation. Manufacturers have developed several technical approaches to identifying underwater plants. The advantages are obvious: fish finders allow us to scan the depths, the habitat of the fish, which normally remains hidden to us.

5.2.1 Fish finder for boaters

Boaters regularly use fish finders. Since boaters fish the entire water body and not just the shore, they depend on technical aids.

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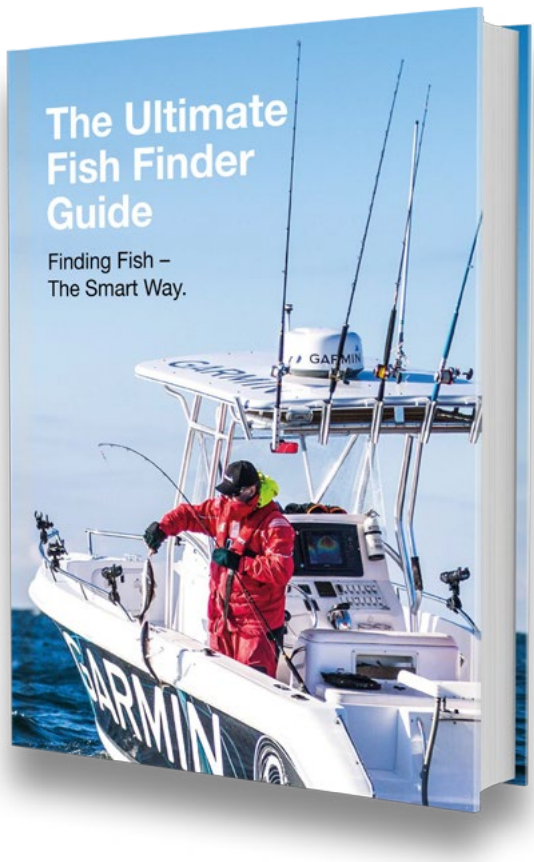

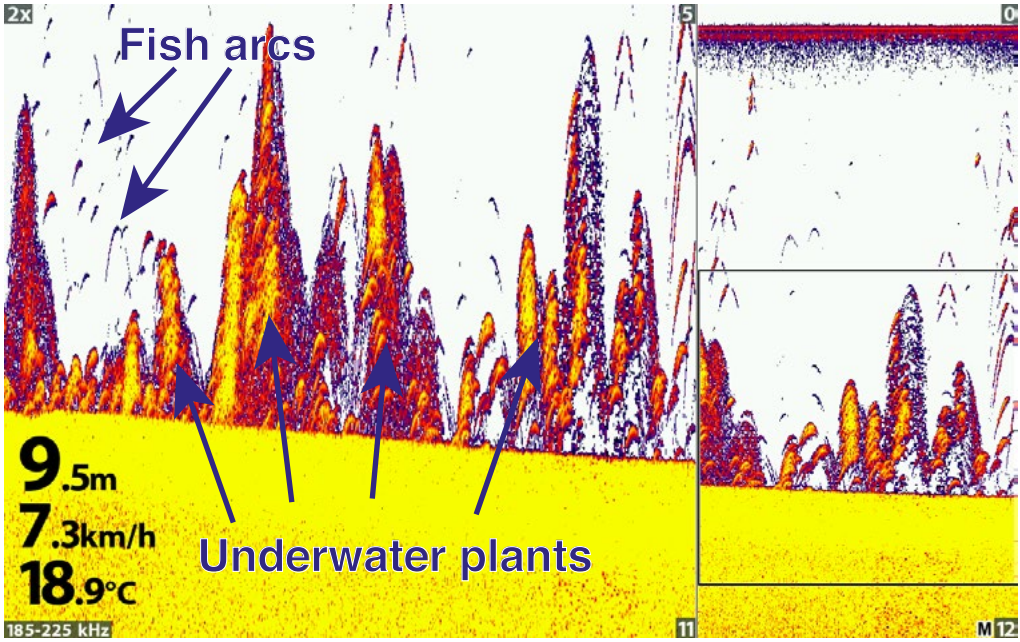

Figure 5.3—Underwater plant echoes

We can clearly see the echoes of the underwater plants here. They differ from the fish by a weaker signal and are displayed in red. The fish, which swim bladders reflect the sound of the fish finder more strongly, are shown in yellow. We can see that the fish stay near the vegetation. In order to be able to interpret the image more precisely, a bit of basic knowledge about fish finders is required.

Figure 5.4 — Vegetations of varying scope

Newer generations of fish finders give us an even clearer impression of underwater vegetation with the right map software. Basically, plants produce echoes with a typical wavelength, and some fish finders can detect this. The map function of our Humminbird fish finder gives us a very nice overview of the different vegetations. The images were taken on October 2017, so that many of the plants already retreated, appearing in dark green (few plants). We can still make out one or two light green spots where the vegetation remains thick.

5.2.2 Fish finders for fishing from shore

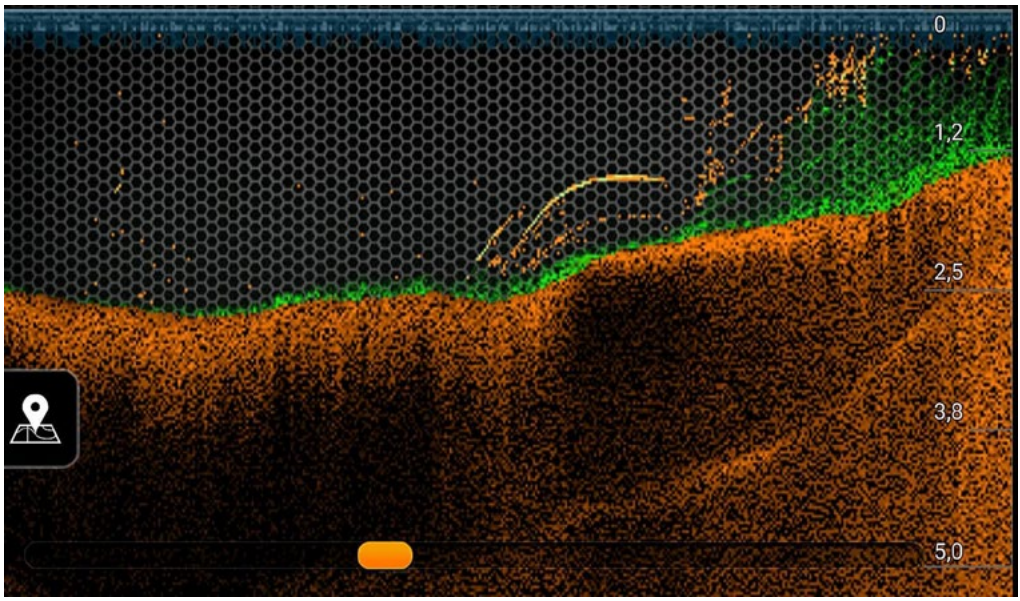

Figure 5.5—Vegetation recorded with a Deeper

Not only boaters can use fish finder. The Deeper has revolutionized fishing from the shore. You can attach the depth sounder to your line and then simply cast it out. On your smartphone or tablet, you can track what is going on underwater. The beauty is that the vegetation is displayed in a different color.

Remember

Fish finders are an essential part of our fishing equipment. They aid us to quickly locate good hotspots. The opinion about depth sounder is still divided among German anglers. While some love fish finders, others curse them and say that this has nothing to do with fishing anymore. We chose not to take sides.

We would like to point out, however, that fish finders do not come with a guarantee for large pike. Pike fishing is a challenging undertaking, and even the best baits and the best hotspots do not guarantee success.

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5.3 How many pike stay in a water body?

The exact number is hard to determine of course. Scientifically, we measure the size of a fish population (biomass) in kilograms. That gives us a good impression of the pike stock. Many studies recorded different results depending on the lake. Scientists always express the pike stock in kg per ha, meaning mass per area (hectare = 100 x 100 meters).

In narrow shore zones with little vegetation, one can assume 10-20 kg/ha. In wide shallow shore areas with good fish and vegetation, it can rise to 80-150 kg/ha. We only attain those maximum values, however, in broad, overgrown shore areas, which provide habitat to many underwater plants and pike.

5.3.1 Pike in lakes

Anyone who suspects relatively large pike population in larger lakes is mistaken. Most larger lakes do not have optimal plant growth compared to smaller lakes or small rivers. The fluctuation of the water level is not very optimal for young pike. Also, on large water surfaces, winds can cause strong waves. That constricts the habitat and forces the pike to concentrate in deeper regions.

Pike < 20“ (50cm)

Scientists can also express the biomass of a species in precise numbers. For an optimally overgrown shore zone, we estimate approximately 5,000-10,000 pike of class 3-6“ (8-15cm) per hectare. For larger pike, these numbers decline to about 4,000-7,000.

Pike > 20“ (50cm)

Now it gets exciting. The question is, how many catchable pike are there in different waters? The numbers for smaller sizes go into the thousands. The data we reveal comes from various studies and has been obtained using a wide variety of scientific methods. Even if the numbers can never be pinpointed exactly, the figures give a good estimate. The number of pike and the biomass in kg per hectare are given.

Number of pike per hectare

River	Age	Number per ha	Biomass kg per ha
Nene	1–6	200	115
Oulujoki	2 +	4.5	7.2
Plover	4–9	54	28.9
Lake	**Age**	**Number per ha**	**Biomass kg per ha**
Daggett	3 +	2.6	5.4
St. Peters	1–13	71	51
Windermere (GB)	2 +	18.5	5.3

The figures surprised us quite a bit. 2-200 pike per hectare (that is 5-500 per acre) got us a bit nervous. 50-200 per ha (that is 150-500 per acre) pike okay, great. That would be more than enough. But 2, 3 or 5 bigger pike per hectare? What are the odds of catching one of the few pike as it is hungry and hunting?

The study conducted in Windermere is, by the way, one of the longest of its kind. From 1944 to 1985 researchers tracked the pike population. The available pike habitat (depth up to 30 ft) in Windermere is 550 hectares (1,500 acres).

It is not for nothing that pike are at the top of the food chain. How many of these great predators stay in a water body depends on the available habitat. It is nice to see, however, that there are waters that are rich in pike. That means you should listen closely to what other anglers have to say about their waters. That should help you to assess the pike population of different waters a little better.

5.4 Habitats for every age group

5.4.1 Young predators

Pike lay their eggs in dense vegetation. The preferred plants in the spawning area are usually short and form large thick areas. The eggs and even the hatched embryos stick to the plants for a while so that they do not fall to the often oxygen-poor ground. The pike larvae (up to 0.4“ (10mm) length) may stick to a plant for up to 12 days. Again, we see the vital role that vegetations play in the early development of pike.

After detaching from the plants, when the water has warmed to over 50°F (10°C), the small hatched pike find shelter and plenty of food in the vegetation. From this point on, the small pike focus on survival. The vegetation aids in that regard. Life among pike is dangerous because cannibalism is a constant threat for this age group (see chapter 3.4.4 „Cannibalism or the pike as prey“ on page 48).

Once the pike have reached a size of approx. 1“ (2-3cm), they leave the spawning grounds and look for new sites. In Central Europe, this usually happens sometime in April. With the rising temperatures in spring, the water-level sinks bit by bit. The increasing hunger drives them deeper into the water. 15-25 days later they reach a

size of about 3-6“ (8-15cm). The young pike now prefer less dense vegetation where they can move freely between and above the aquatic plants. However, this freedom increases the odds of falling prey to other predators as well. At this age, pike live most dangerously, and external circumstances such as cold spells, plant death or abrupt water level changes can easily endanger their survival. To their larger conspecifics, the young pike become more and more attractive.

The highest concentration of young pike we can find between completely submerged plants. In these areas, there are ten times more pike than in areas without strong vegetation. That does not change until late in the summer. As they grow, the young pike have a white-yellow stripe pattern. Their dark green color matches the vegetation near the shore.

Pike can grow at different rates depending on the depth of their territory. With a size of 9“ (23cm) at the second measurement, the small pike that were staying at a depth of 8ft (2.5m) were almost five times as long as their peers that stayed in 2ft (0.6 m) deep water. Despite this finding, we conclude that the main habitat for young pike remains the shallow shore area.

Remember

Young pike, which search for deeper, less optimal habitats and that survive, grow faster than their peers. Many experiments have confirmed this phenomenon. The larger pike will later displace their smaller conspecifics. As these pike feed more and grow faster, they are more likely to become active predators.

5.4.2 Finally grown up

Pike mature early. Often, pike produce offspring as early as their second year of life. Some male pike can even become sexually mature in the first year. From records of pike studies in northern Russia, we can read that some pike may not sexually mature until the years 4-5. The sexual maturity of the pike is rather dependent on the weight and the size than on the age itself. With optimal conditions, pike can grow up to 20“ (50cm) within the first year. Most pike will measure in at 15-20“ (30-50cm) on their first birthday. The right water temperature and abundant food are important factors for good growth in the first months.

The pike lose their stripe pattern during the transition to adulthood. The stripes dissolve slowly and turn into dots. The dot pattern provides better camouflage in the outer areas of the shore zone.

Once they are sexually mature, the pike‘s lives revolve around reproduction, as it does with all animals. To preserve oneself and thus the own species is an instinct to which we are all subject.

Pike will spend their first years near the shore and mainly in water up to 13ft (4m) deep. They will be faithful to their habitat and will not leave their territory often. Since pike

have big mouths, the smaller adults still run the risk of being captured by their conspecifics. Their territory offers them protection and food sources.

Only once they have reached a size of about 20-24“ (50-60cm), their trips become more adventurous. They start to switch territories more frequently in their hunt for bigger prey. With a bigger size, they are less attractive to other predators now. The young pike have grown to the top of the food chain.

Pike size	Food	Vegetation	Territories
up to 6 in (15cm)	▶ zooplankton ▶ insect larvae ▶ sporadic fish	▶ strong vegetation ▶ Vegetation half under water	▶ meadows ▶ marshes ▶ shallow ditches ▶ very overgrown shore zones
6 – 14 in (15 – 35cm)	▶ mainly fish	▶ decreasing vegetation	▶ ditches ▶ heavily overgrown riparian zones ▶ ancient arms ▶ flat channels
14 – 20 in (35 – 50cm)	▶ mainly fish ▶ smaller inhabitants of the shore areas (chicks, mice, crabs, etc.)	▶ reed belt ▶ semi-submerged vegetation ▶ water lily fields	▶ deeper trenches ▶ overgrown riparian zones ▶ ancient arms ▶ flat and deep channels
20 in (50cm) and above	▶ mainly fish ▶ smaller inhabitants of the shore areas (chicks, mice, crabs, etc.)	▶ underwater plants ▶ temporarily no vegetation (change their locations more frequently)	▶ deeper trenches ▶ overgrown riparian zones ▶ ancient arms ▶ canals ▶ increasingly also open water

Starting from a size of 28-32“ (70-80cm), some of the larger pike leave the shore to move into the open water. They have a hard time now to catch small prey in proximity to the shore, and instead chose to follow the medium- and large-sized prey fish into the open water. Dense vegetation hinders attacks near the shores, and the pike have a harder time hiding due to their size and the light in the shore area.

Large pike love areas at the borders to the open water that offer a bit of underwater vegetation. Here, they can move between the open water and the light vegetation. The underwater plants are not dense and allow the larger predators to swim freely. Obstacles or rough subsoil also provide great hotspots for large pike. These obstacles are

usually at the edges of the shore towards the open water.

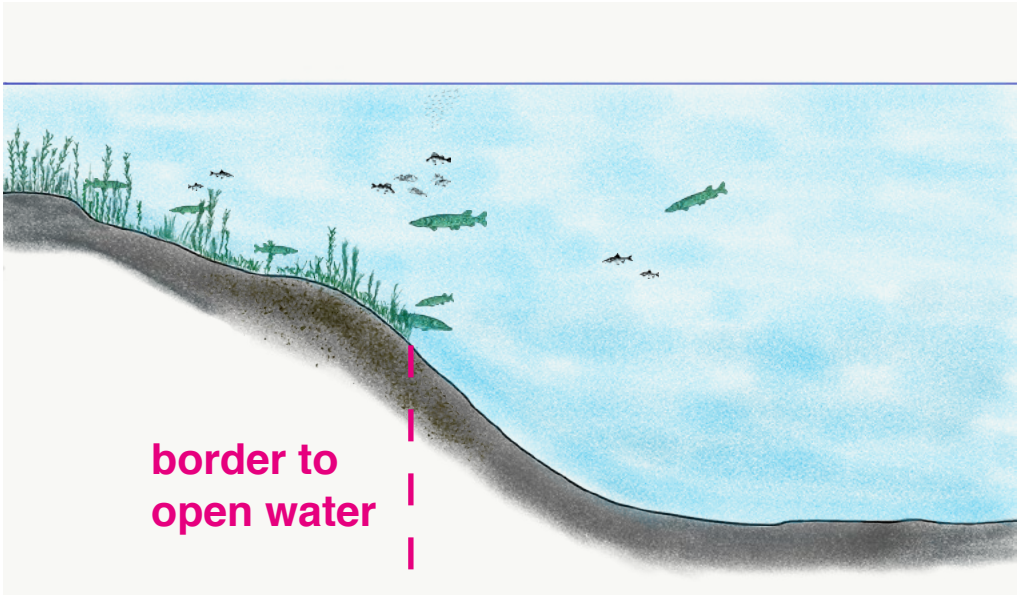


Figure 5.6—Large pike at the edges

Pike also grow at different rates depending on their prey. Pike that feed on large—the word „large“ is key—whitefish such as bream usually grow faster than pike that prefer other fish.

The largest pike stay in the open water without significant vegetation. It is interesting to note that the smaller the pike population, the higher the number of large pike. We assume, in these conditions, there is less competition for food allowing each pike to feed abundantly. A sizeable pike stock is therefore not quite so advantageous for those who are looking for trophy pike.

Chapter 6

The Year of the Pike

6.1 Calendar periods

Although we are now familiar with many chemical and biological influences, we have not yet investigated how time, especially the calendar periods, impact the pike and their behavior.

Calendar periods? Is it not enough to account for the seasons? We have established that „in spring the pike stay shallow“ and „in autumn they bite like crazy at the edges.“ Is that not information enough to estimate the best hotspots?

Absolutely not! Each season covers a period of about three months. During these three months, the living conditions under and above water can change rapidly, requiring us to adopt our bait presentation fundamentally. Remember the potential of oxygen scarcity in midsummer, or take spring as an example:

The pike spawn in spring. During this time they stop feeding completely. However, there is also a time before spawning and after spawning when they feed more frequently. During spawning, all pike stay close to the shore, rendering fishing trips to the open water unsuccessful. After spawning, the pike migrate to their respective summer territories—but not all at the same time.

There is no clear classification based on time, either. Pike do not orientate themselves on the calendar when spawning but on the water temperature—ideally 41-54°F (5–12°C). In one year, we might get the optimal temperature in March, in another in April. Flat lakes generally warm up faster than large or deep ones. The same applies to lakes in the lowlands. Whether in the south or north, the geographical location also greatly influences the duration of the individual periods. All this clearly illustrates that there is no easy answer to the question on the best spring hotspots. To answer this question, we have to account for a multitude of factors, for example, the depth of the water body, the temperature and whether the weather is cloudy.

What might work for anglers during spawning season can cause many slow days in early summer or midsummer. Specific bait colors, advertised with large trophy pike, too often get bought without much questioning. We frequently forget that those baits may work well in one water but not in another. We should also account for at what time of the day the trophy pike was hooked. Manufacturers and resellers usually do not provide this information.

In the US, classifying hotspots, baits and bait presentations according to calendar periods has become standard. Although there is no strictly defined classification, anglers account for more than just the four seasons.

As the 49 US states—we ignore Hawaii, Puerto Rico and smaller islands but include Alaska, as there are some pike—span five main time zones and an area of almost 4 million square miles (10 million square kilometers), a general classification of the best hotspots according to seasons was nonsense from the start. The spawning periods between some US lakes might be months apart. Even in Germany, weather conditions only a few hundred miles / kilometers apart can vary significantly. In some years, Hamburg might have to wait 2-3 weeks longer than Munich for spring to arrive. For this reason, it makes a lot of sense to break down the year into calendar periods.

Remember

A good understanding of how the calendar periods impact the pike will guide us in locating hotspots and our bait selection. The aim of the following chapter is to assess how time affects pike fishing, allowing us to make the most of our precious fishing time. We should mention right from the start that the calendar periods are flexible. They vary from year to year, from latitude to latitude and often from water to water.

The hotspots we share for each calendar period are intended to give you an idea of where to find pike, why they stay there, and what the ideal weather conditions might be. Nobody should try to apply this knowledge one-to-one without accounting for context. We can never with 100% percent accuracy perceive what goes on underwater and above, so the pike will not always react the way we expect. Even the smallest variations can cause some pike to portray unexpected behaviors.

For the calendar periods, we have deliberately refrained from the classification into lakes, rivers, and reservoirs, as pike orientate themselves on the vegetation, which in turn does not depend on the water type. Our explanations, to a large extent, are applicable to many water bodies that host pike. It does not matter whether a lake or river is small or large. We also explicitly include brackish water from marine regions.

If from our perspective, a water body deserves to have some special features mentioned, then we will have already done so in another chapter.

By describing hotspots irrespective of the water body, we can categorize our knowledge. Categorization is useful and we humans love to do so. Nevertheless, we anglers have to be flexible, to react if the context requires adoption. That way, over time, we will be able to instinctively adapt to the most diverse situations on the water.

12 months – 10 calendar periods

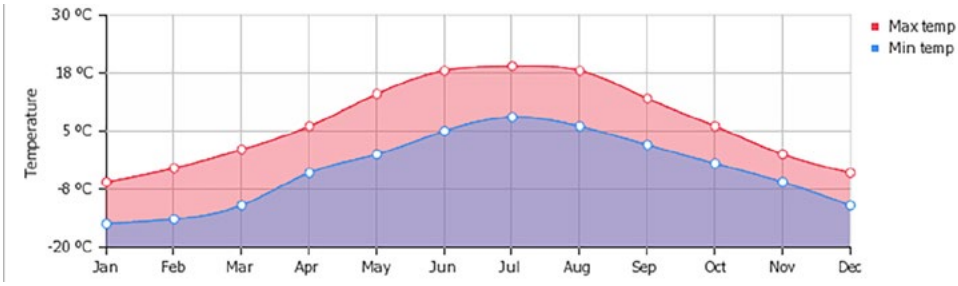


Figure 6.1—Water temperatures in Sweden (Lake Storsjön)

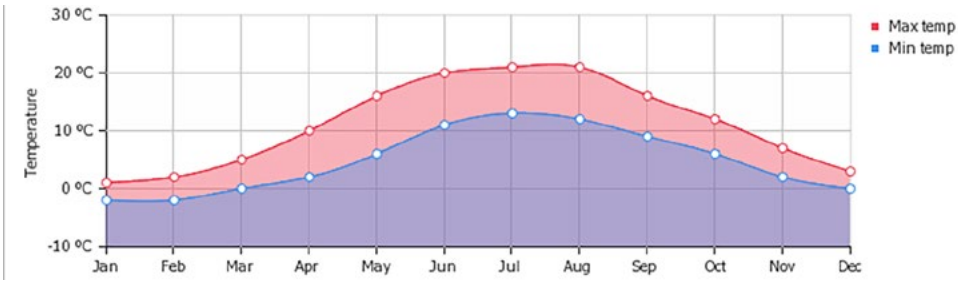


Figure 6.2—Water temperatures in Germany (Rügen Bodden)

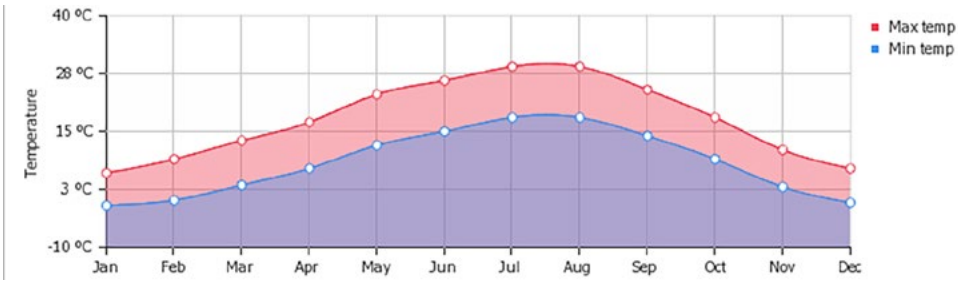


Figure 6.3—Water temperatures in Italy (River Fiume Adige)

1. Winter is here - Frost (water temperature: 32-46°F (0-8°C))
2. Before spawning (water temperature: 32-46°F (0-8°C))
3. The spawning period (water temperature: 39-54°F (4-12°C))
4. After spawning (water temperature: 43-54°F (6-12°C))
5. The end of spring (water temperature: 50-63°F (10-17°C))
6. Summer (water temperature: 59-70°F (15-21°C))
7. Midsummer (water temperature: > 72°F (22°C))
8. Late summer (water temperature: 59-68°F (15-20°C))
9. Autumn change (water temperature: 50-59°F (10-15°C))
10. Cold temperatures (water temperature: < 50°F (10°C))

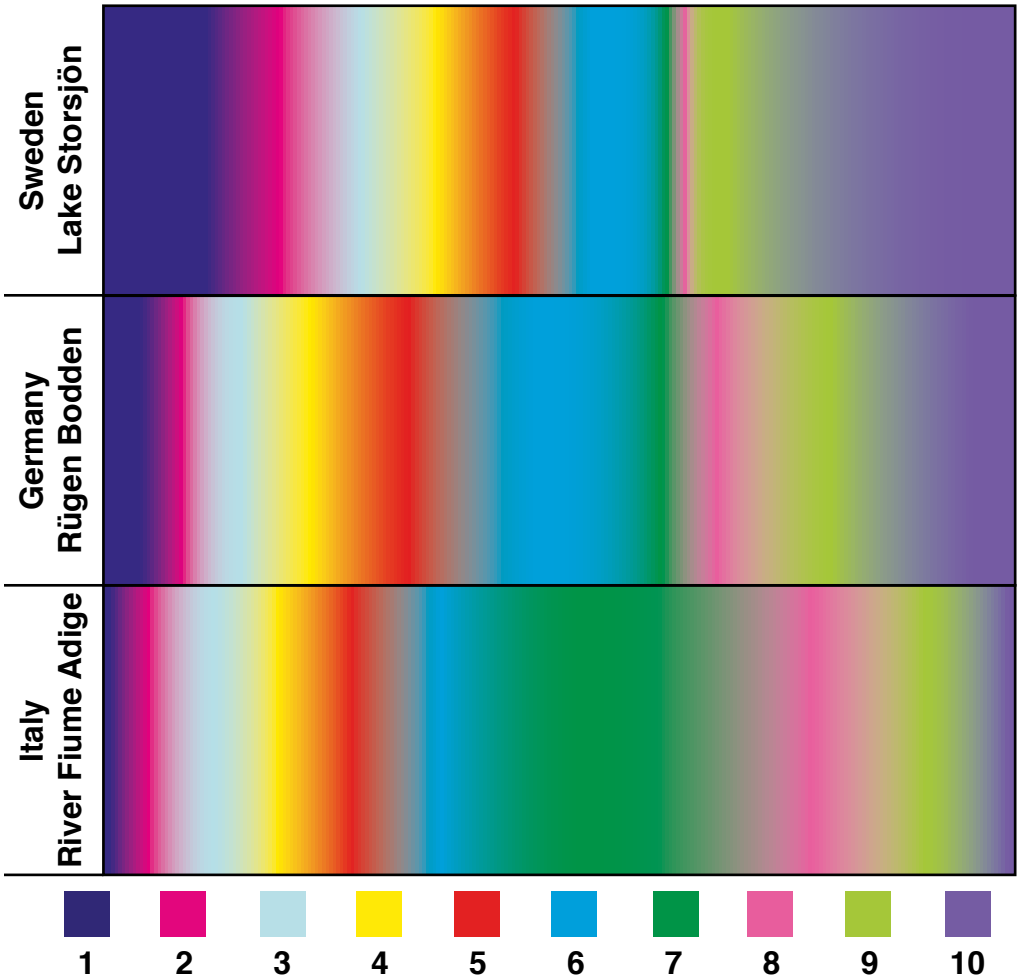


Figure 6.4—Differences across the calendar periods for Sweden, Germany and Italy

It is easy to see in this illustration that the calendar periods can have a different duration between regions. For some anglers, the summer period is more important, while for others the spring period receives a lot of attention.

The classification according to calendar periods has the additional benefit of making more informed decisions during international fishing trips.

6.2 Winter is here - Frost

Water temperature: ± 32°F (0°C)

We know little about pike fishing in the deepest winter. Likely, that is because fishing, and therefore also the conventional literature, focuses more on the warmer seasons. It is also not easy for science to carry out experiments and studies in winter.

For the pike, this period is one without major changes. The temperature of the water

column is relatively constant throughout. Longer frosty periods can have an additional influence on the water and the pike. In extremely cold winters, a more or less thick layer of ice forms on some waters.

Of course, frost is not a phenomenon at all latitudes or in all waters. For anglers in Scandinavia, these periods certainly have a bigger impact, as the frost period lasts longer than in Germany or France. In Central Europe, we only have to consult this chapter every few years.

The cold season is extremely important for the pike, as the cold give the eggs of the females the last boost to develop. Overall, the water temperature must be below 46°F (8°C) for 2-3 months for the eggs to develop well. If temperatures stay above, the pike population will gradually decrease.

The constant water temperatures give the pike the opportunity to explore the entire water. And many do, swimming longer distances than in summer. Especially in bigger lakes, some pike are more mobile in winter, especially the large ones. The speed at which pike swim is slower than in summer. No pike races from one place to another. Some other pike choose to move less frequently, doing the exact opposite by reducing the size of their territory. These pike tend to stay close to the reeds and their radius of action is unbelievably small.

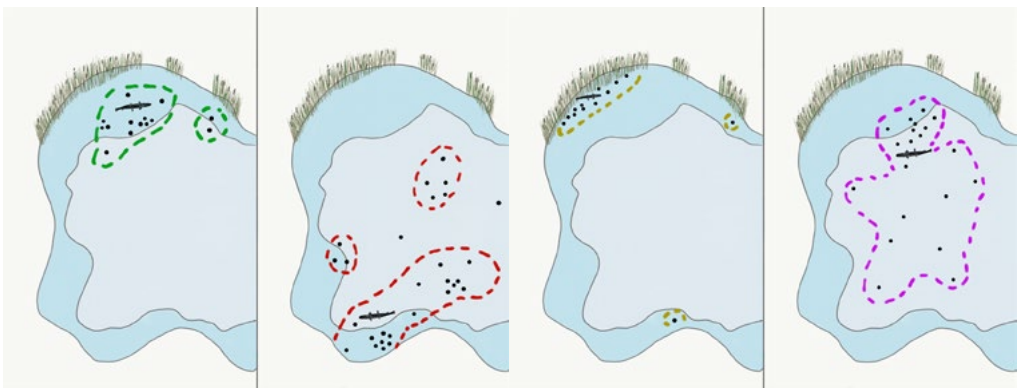


Figure 6.5—Pike territories in winter

Pike territories can differ a lot during winter. It is nice to see that in winter some pike inhabit a larger area, while others restrict their radius of action.

6.2.1 Oxygen

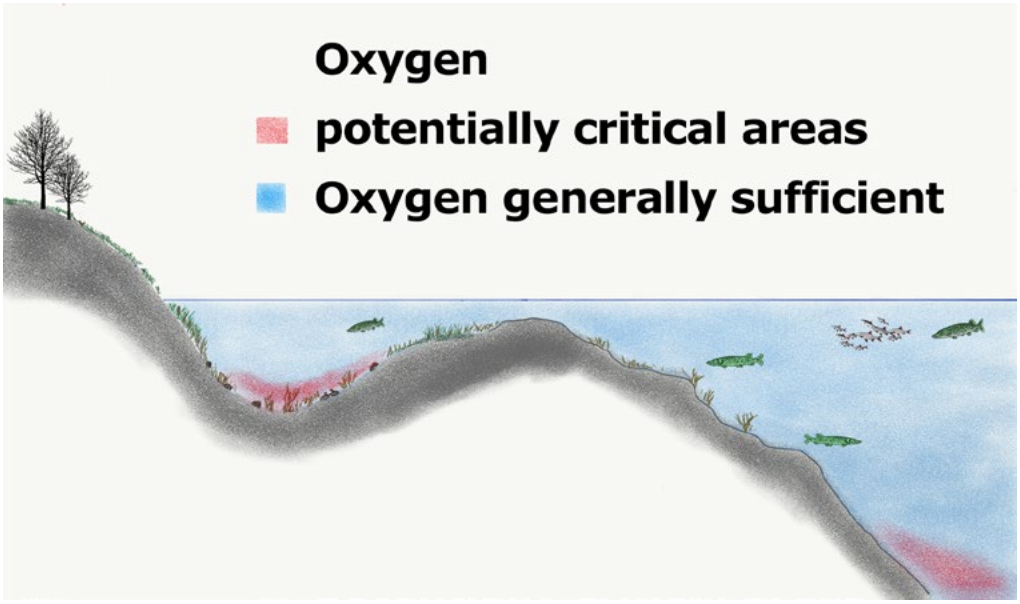


Figure 6.6—Pike territories towards open water

During winter, the oxygen concentration in the shore area can decrease noticeably. Bacteria decompose the dead underwater plants and consume huge amounts of oxygen. That can quickly cause extreme conditions, especially in heavily overgrown and shallow shore areas. If these shore areas are isolated from the open water, they quickly become scarce in oxygen. For example, bays cut off from the open water more often experience oxygen deficiencies than open, extensive bays in which the exchange of water is usually still intact.

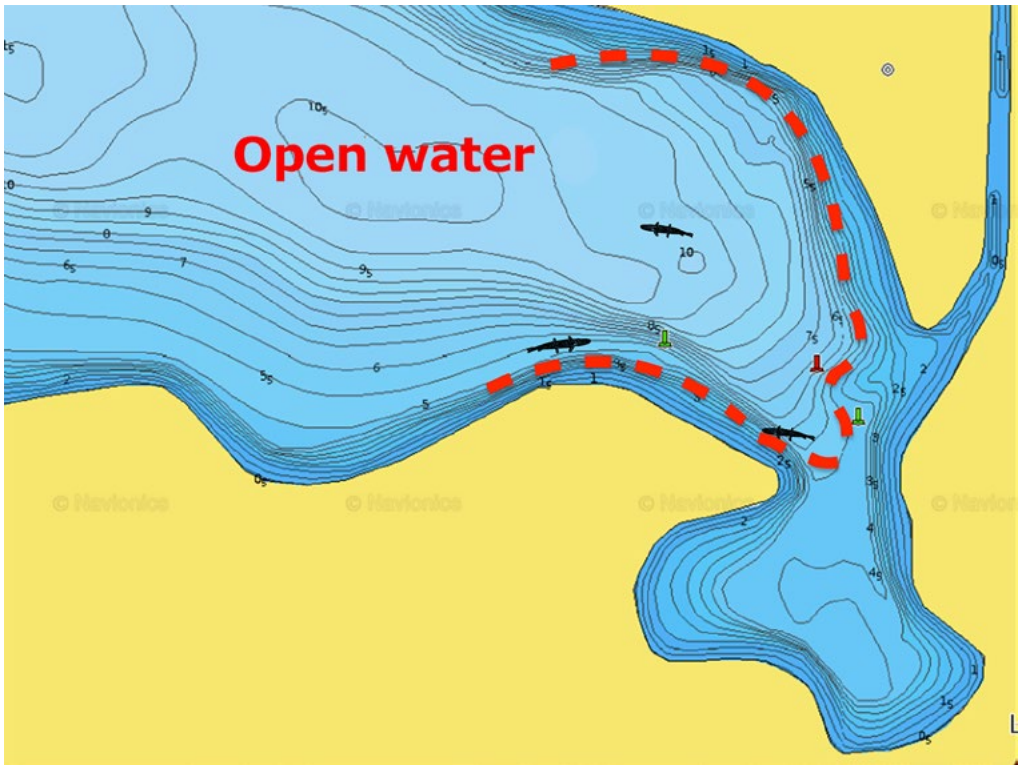


Figure 6.7—Sharp drop-offs

In general, many fish migrate towards the open water in winter as their oxygen demand is more demanding than that of pike. In the open water, they often stay deep where it is warmest. During the day they move toward the surface. Pike, on the other hand, react much differently. Many of them move towards the depth, but not at all times and by no means all of them. The vegetation also plays a major role in the choice of hunting grounds during the frost period. If the shore falls off quickly and some vegetation remains, this offers enough space for the pike. Even if the water freezes over, 6-10ft (2-3m) deep shore areas offer enough space for some predators.

6.2.2 Flowing waters

Water that flows is not only in motion but also the oxygen concentration is often much better. The cold water allows mixing of the water layers without problems so that the entire water column is evenly enriched with oxygen. Locations where rivers feed lakes are great hotspots. Where the water flows into the lake, the fish gather in cold winters. Both prey and pike are magically attracted by the good oxygen conditions in these areas. Paired with a sunny day, you can have a great day of fishing in these spots.

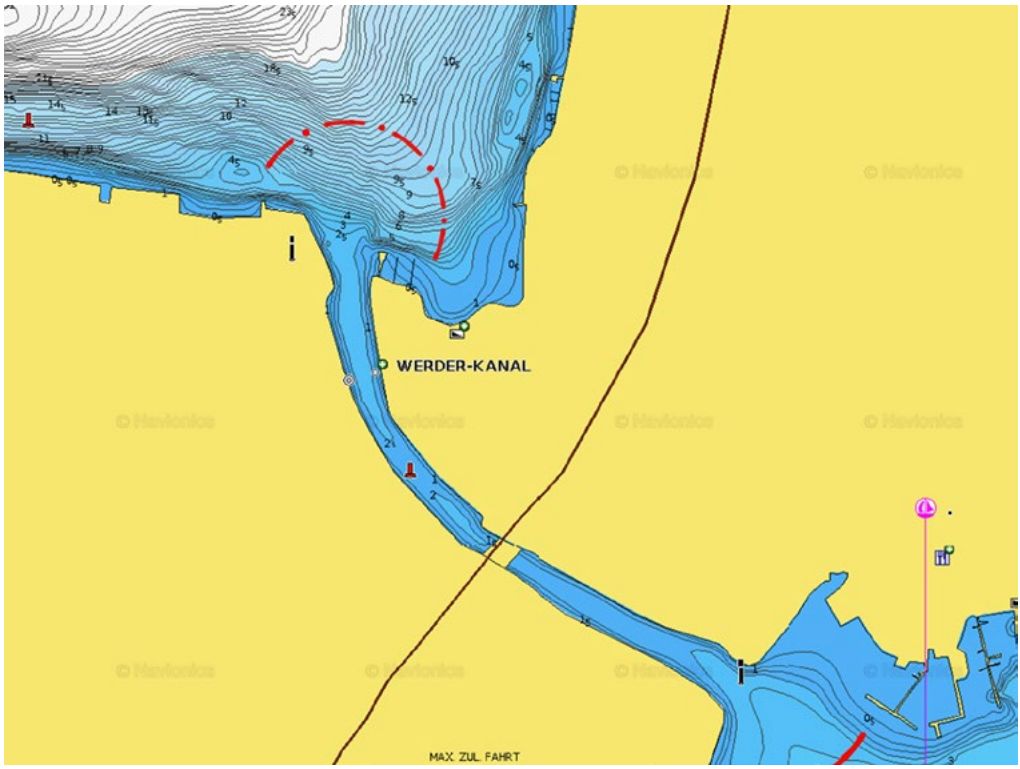


Figure 6.8—Incoming rivers

Pike that live in rivers often stay stationary for many days during the cold season. During the entire winter period, many pike have a small radius of action from a few metres to only a few hundred metres. Various records prove this, defining the radius of action from 160-1,600ft (50-550m) with an average of 1,000ft (300m).

6.2.3 Special features - eutrophic and polytrophic lakes

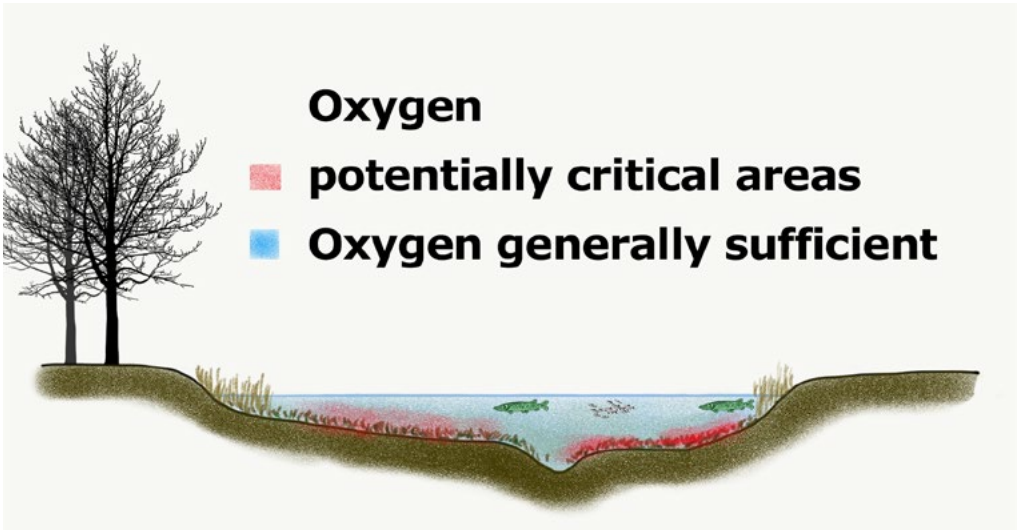


Figure 6.9—Pike in the upper layers of the water column

If the lakes are small and shallow, anglers do not have it easy during a strong winter. Due to their small size and depth, these lakes freeze up particularly quickly. Most of the leased waters fall into this category. Since the plant growth is extremely strong in summer, there are a lot of bacteria in winter. For this reason, the oxygen concentration can be pretty low. Fish and pike stay higher up in the water column, above the deepest parts of the lake.

Pike which constantly experience these conditions can cope better with oxygen deficiencies than their conspecifics which irregularly have to survive such an environment. Winter kills are not uncommon as most fish cannot survive the lack of oxygen and die. Large fish are affected faster than the smaller ones.

Pike are among those species that frequently survive winter kills. Other fish species often have to be artificially restocked.

6.2.4 Special features - Mesotrophic and oligotrophic stagnant waters

In these waters, the probability of oxygen deficiency is lower. They are usually deeper, and plant growth is more or less pronounced in the summer months, depending on the water body.

6.2.5 Ice

If ice forms, sunny days draw the fish stock to the surface. Since some prey fish stay in deep holes, they migrate straight up to the ice layer. If you regularly go ice fishing, you know that you do not have to necessarily drill your holes right on the shore. Pike are also more likely to feed on sunny days.

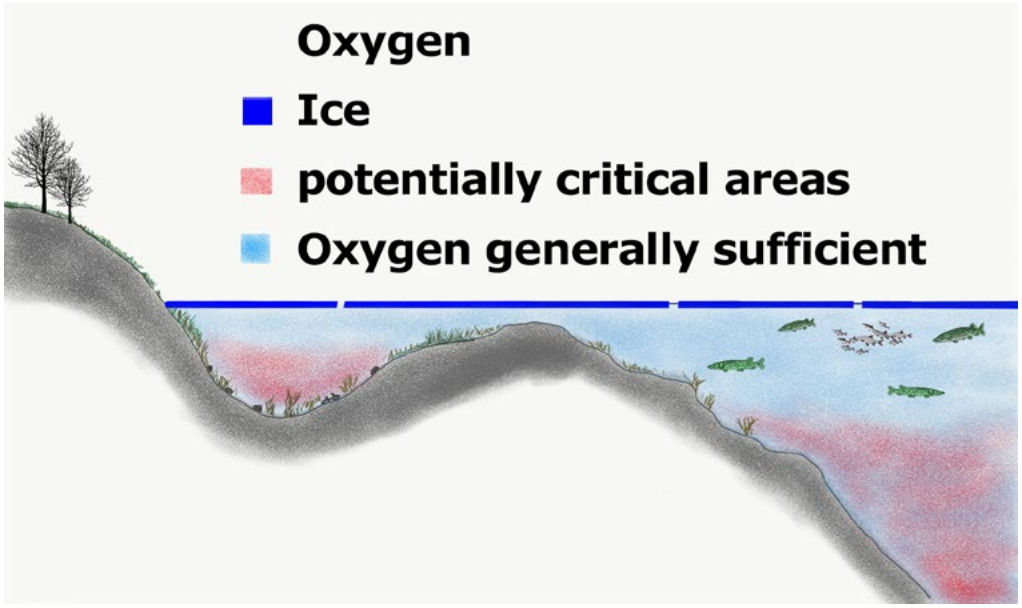


Figure 6.10—Pike and ice at the top of the water column

Scientists assume that on a sunny day the light intensity directly below the ice (30 to 75 foot-candle (350 to 800 lux)) is similar to dusk in summer, which is why many pike start to feed. In some experiments, pike activity during a sunny ice phase was similar to that at dusk in summer.

Figure 6.11—Pike fishing on the ice

You can spend a sunny winter day on the ice fishing for pike. It is important that you offer the bait just below the ice. If the light of the sun can enter the water through the borehole unhindered, it acts like a magnet on small and large fish.

Figure 6.12—Winter pike - Jan Pusch

Ice can cause death, too. If a layer of snow lies over the ice, sunlight no longer penetrates the water. The ice also prevents any oxygen exchange with the air, so that the oxygen concentration in the water gradually declines. If these conditions last for several weeks, winter kills can occur. Many fish, starting with the large ones, will suffocate and die. If this situation occurs, it will take time for the local fish stock to recover. Pike can survive a lack of oxygen better than, for example, whitefish. Winter kills are rare, however. Fish have adapted well to these extreme weather conditions.

Larger waters such as the Müritz, but also the shallow areas of the southern Baltic Sea freeze more rarely, and when they do, water exchange still occurs due to the size of the waters. If the shore areas do freeze over, pike can easily dive towards the oxygen-rich depths. In winter, the pike living there are little or not at all affected by potential winter kills.

Remember

Fishing for pike in winter is a big challenge. The low water temperatures reduce the predator‘s metabolism so that they only have to feed every few weeks. Ice and snow cause the oxygen concentration to drop, resulting in the pike biting less. It is a special achievement to catch a pike during ice fishing.

6.2.6 First warm sun rays

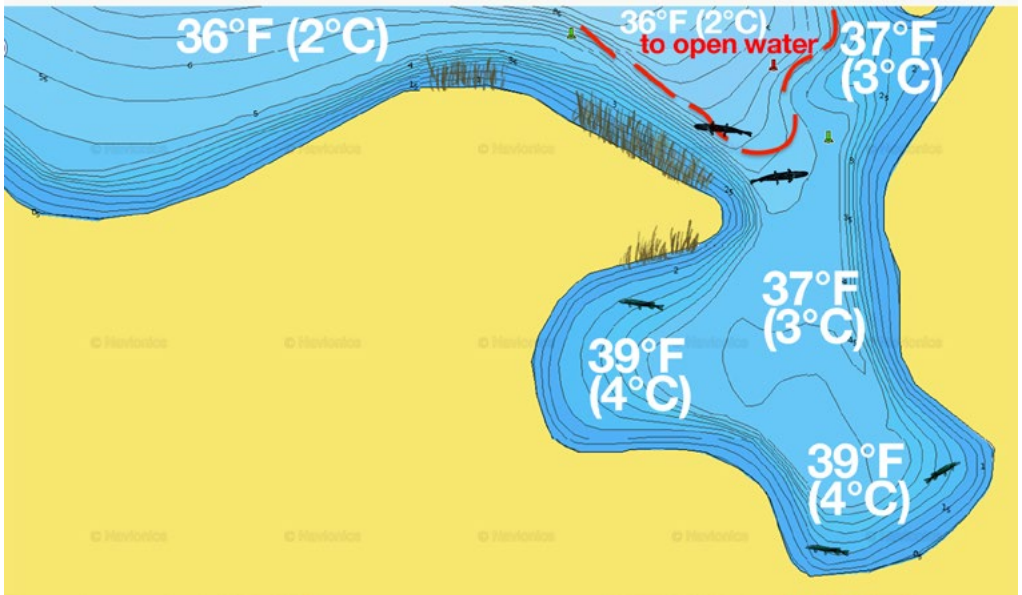


Figure 6.13—Temperature differences on sunny days

Sunny days have a very strong influence on pike. In sunny weather, they will move into shallow water during the day, not necessarily to eat, but to warm up. They enjoy every ray of sunshine. If possible, some stay in shallow spots with a depth of only 8“ (20cm). At this time of the year, the water is still so clear that we can spot the pike in the far depths from above. If you stalk quietly, you will not only see the pike but also be able to catch one or two. During no other time of the year do large pike stay so close to the shore.

The best time to fish is in the afternoon. The water in the afternoon is much warmer at 39°F (4°C) than in the morning at 3°F (2°C). As a result, pike are more active shortly before dusk than they are in the morning. The large pike stay at the sharp drop-offs towards the deep water. Those who can reach these edges from the shore or boat will probably not have to go home empty-handed. If it is sunny, Wobblers that stay close to the surface promise a lot of success. Just be sure to reel them in slowly.

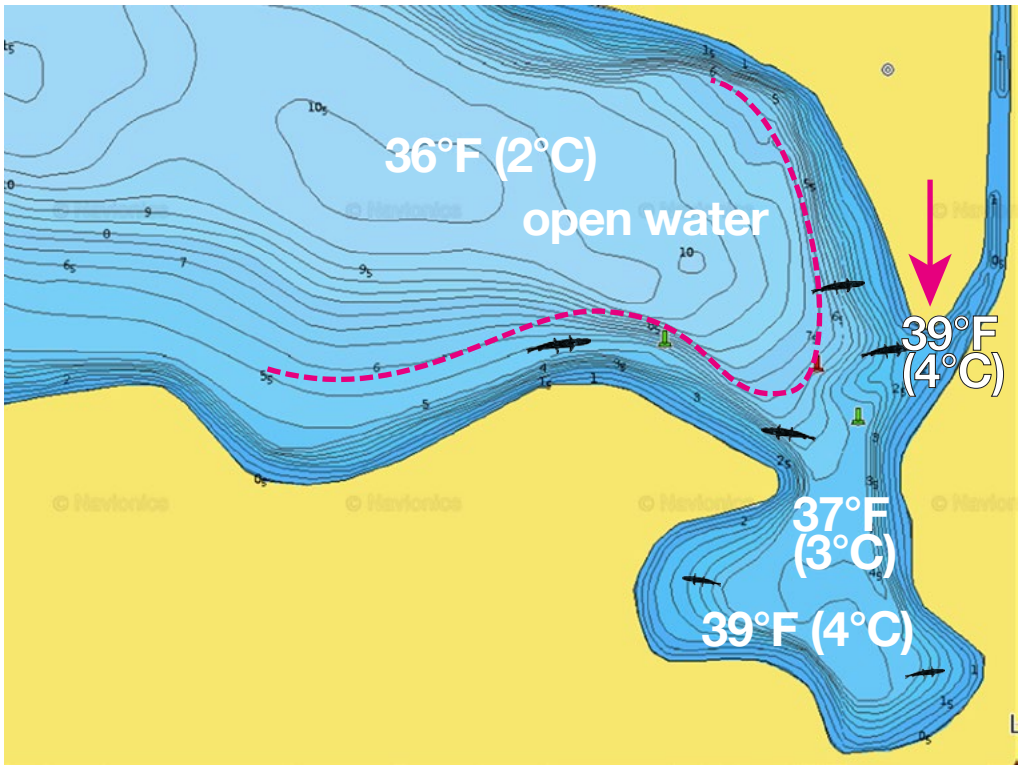


Figure 6.14—Water inlet - ice-free bay

Another good hotspot are the first ice-free bays in the area. With our knowledge in hand, we can easily locate those bays. Small and shallow bays close to a flowing current should be ice-free first. In the winter, the flowing water is usually warmer than the standing surface water. The ice layer melts faster and gets carried away by the light current.

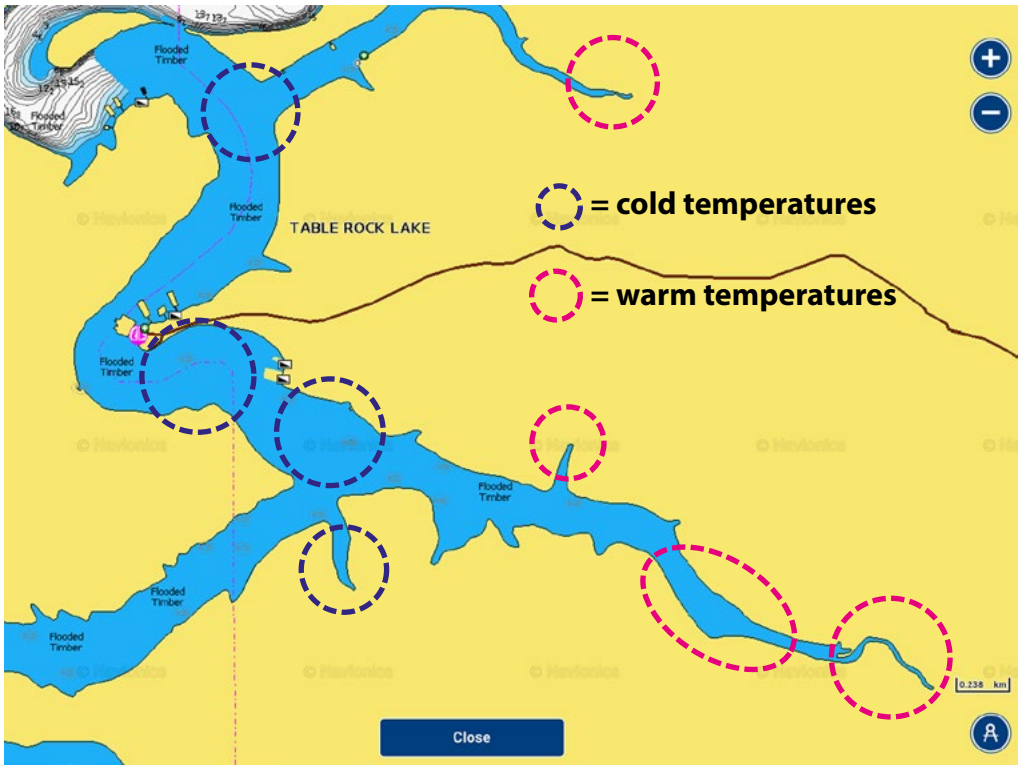


Figure 6.15—Pike in river systems during the cold season

In rivers, after one or two warm days, pike move to the shallowest areas. We can catch the pike quite well from land in these spots. If a cold front comes in again, the pike return to the deeper water.

6.2.7 Baits

Pike do not feed as much when it is cold, however, they still have to replenish their energy reserves from time to time. Even if the pike catch only 1-2 prey fish every few days or weeks, they continue to grow. They gain weight which is great news for us anglers.

Pike prefer easy prey. They prefer to scavenge for dead fish on the bottom or to hunt smaller fish. Cannibalism among pike is now at its lowest level for the whole year. Trying to activate the pike with fast bait movements, will not bring a lot of success.

The beginning of the year is the perfect time to try out alternative baits. Small and easy to hunt prey fish do not exist yet—90% of the fish hatched last year did not survive the first year, and the remaining fish are no longer small. Hungry pike grab whatever they can find. If you try a fly or crab now, you can be quite successful.

Remember

Be cautious of general statements that claim that pike stay in specific spots during winter. Studies have clearly shown that pike display a multitude of behaviors. Some cover long distances in the winter and others restrict their territory to a mere 160ft (50m).

The temperature, oxygen content, and light intensity have a decisive influence on the pike. They are the most important triggers during the coldest season of the year. It is not hunger that causes the pike to bite, but external stimuli. The pike hunt for easy prey but without exerting much energy. During this time of the year, the pike can go without food for multiple weeks, so having to wait a day or two longer for easy prey to come by does not make a difference. Changes in the weather that potentially bring clear and sunny days impact whether the pike will bite.

Oxygen-rich zones are the hotspots with the best odds. Here we can find the prey that is not as well adapted to the cold season. Some of them are constantly on the lookout for these spots.

Note from the „Fishfinders“ Team

We would like to ask that you read the chapter on the spawning season with sustainable fishing in mind. It is essential to comply with country-specific laws, in particular, those relating to closed seasons and catch sizes. When we talk about hotspots and baits in the following chapters, we do not encourage or call for a violation of these laws.

6.3 Before the spawning season

Water temperature: approx. 32-46°F (0-8°C)

As spring approaches, the sun has a great effect on life underwater. Pike instinctively prepare for spawning, subordinating all their behaviors to this period. Spawning season is only a short while away. The pike will now gradually leave their winter territories. The males and large females make their way to the spawning grounds. The water temperature allows the pike to move slightly more. Since they need strength to reach the more or less distant spawning grounds, they fill their stomachs again. Depending on the latitude, the spawning process begins at different times. In Germany, for example, the pike will make their way to their spawning grounds around February/March, while in Finland, the pike do not start to move until the end of May/beginning of June.

Pike travel different distances to their spawning grounds. The distance depends on the water body. In small lakes, the spawning grounds may only be a few metres away,

while in large lakes and especially in rivers and reservoirs, pike sometimes have to cover many miles / kilometers. The longer the journey, the earlier the pike will set off. Pike that inhabit rivers have to cover long distances quite regularly. How long the journey lasts depends on the pike and the respective environmental conditions—a sudden cold spell can delay the start of spawning season for several days or weeks.

In the river Ourthe (Belgium) six pike were equipped with transmitters. Their paths were recorded for up to 349 days in a 18mi (30km) long section of the river. The distance covered by the pike ranged from 0.5mi (750m) to about 10mi (16km). The pike made their way to the spawning grounds at different times from the beginning of February to the end of March 2001. The water temperature was between 43-48°F (6 -9°C) at this time. The travel duration for the pike differed. One pike swam 7mi (11.3km) in 4 days, while another needed 13 days for about 3mi (4.5km). Many rivers flood after the snow melts. The spawning grounds are mostly upstream. Pike have to swim against the current. Larger pike are quicker than smaller ones. But they are not racing machines either. Depending on their size and the strength of the current, they swim at a speed of 0.3-0.8mph (0.5-1.2 km/h). Rarely do they reach speeds above 1mph (1.5km/h). Again and again, they have to take a rest and refuel.

The spawning grounds differ in many respects. It can happen that pike in ditches and the side arms of rivers are already in the middle of the spawning process, while other pike are still waiting to spawn later in places near the river inlets.

Figure 6.16—Spawning grounds in a lake (bay)

In Figure 6.16, the lower bays, cut off from the rest of the lake, are clearly visible. They heat up much faster and offer optimal spawning grounds. Some pike will not immediately migrate to the bays, but will stay at the edges in the vicinity of these areas.

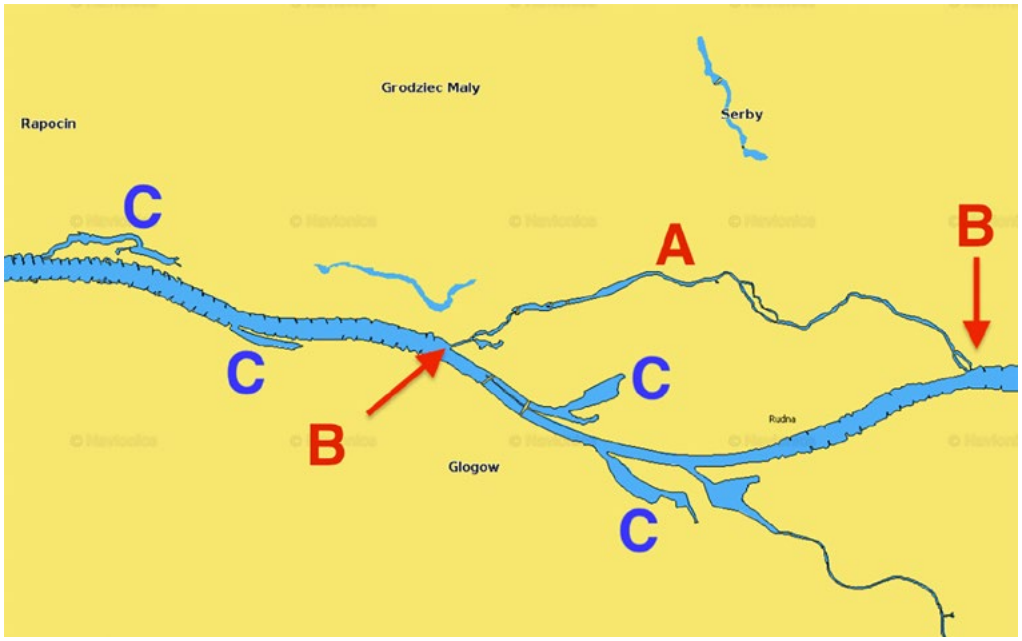


Figure 6.17—Spawning grounds in a river (tributary and side arm)

We see a river here with a tributary. The tributary (A) offers ideal spawning conditions. Probably it is quite shallow and. With the banks and meadows still slightly flooded, pike find the perfect spawning conditions. Here, too, the pike stay in or just outside the tributary (B) before the spawning season.

The two tributaries should be easy to reach from the shore. Not only the continuous tributary is interesting, but also the smaller tributaries of the river (C).

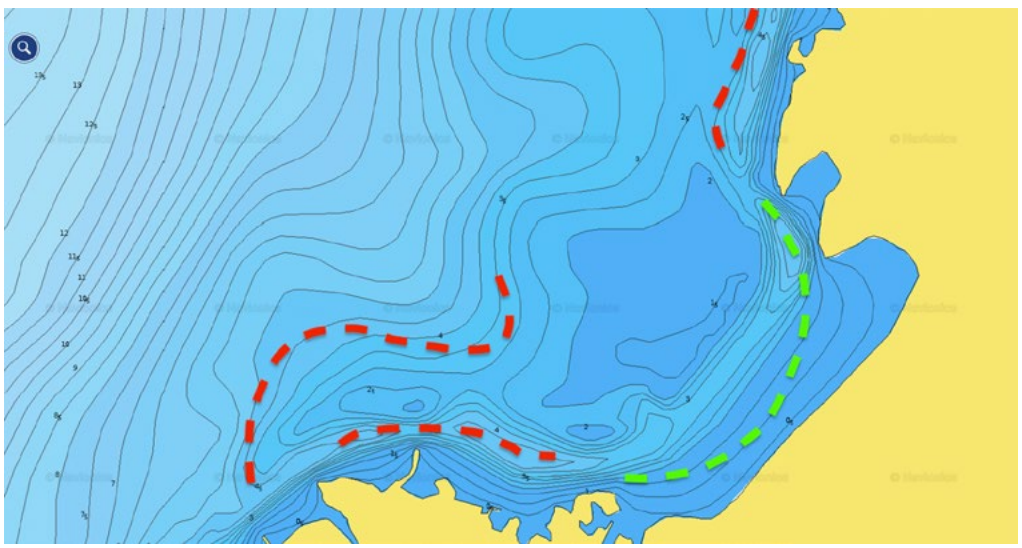


Figure 6.18—Spawning grounds in a lake (shallow bays and shores)

If a lake has shallow bays with sufficient space for spawning, the hotspots prior to spawning are located on the edges of the shallow bays (red line). If the weather is nice, you can try your luck on the shore (green line). As already mentioned, males often reach the spawning grounds far ahead of females.

6.3.1 Finding Pike

The pike concentrate more and more at the potential spawning grounds. For us, this means that most of the shore areas, which later in the summer are flooded with pike, are empty. A badly prepared fishing trip will, therefore, result in slow days more often than not. An intensive analysis of the potential spawning grounds is therefore immensely important. Whoever spots them has taken the first step. With that step taken, we only have to find the pike in the predefined area.

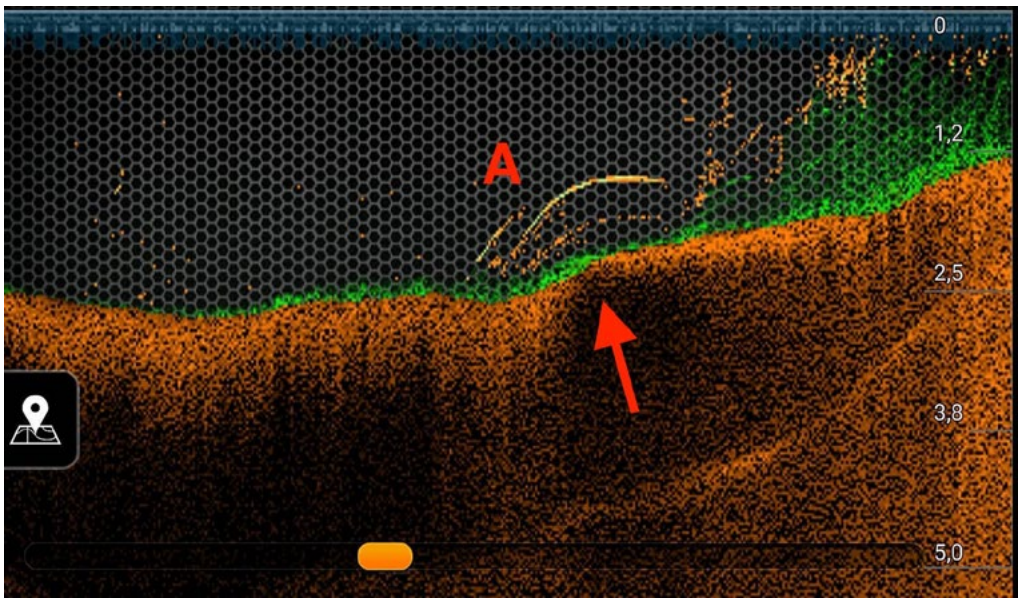


Figure 6.19—Find pike with the Deeper

So close to the shore we can drop a mobile fish finder to locate the pike (point A). A soft bottom (red arrow) gets displayed with a narrow bottom line. The ground here is not as dense and firm as clay. The soft ground provides turbid water that warms up more easily.

Anyone who employs a fish finder should study its functionality thoroughly. You have to learn to interpret the image accurately for it to provide reliable insights. A fish finder is a great tool, but not a magic ball.

Remember

Fishing at the beginning of the spawning season can be very promising. Not many anglers are out, and most pike will not remember last season‘s experiences. With the pike staying close to the shore, they are easy to reach from land. Boats are not of much use at this time of the year because the shallow waters are hard to navigate.

In general, the pike love shallow water when the weather is nice and sunny. The sun manages to raise the water temperature from 36-39°F (2-4°C). That does not sound like a lot from our perspective. However, for a fish a rise in temperature from 36-39°F (2-4°C) can cause quite the spurt in energy. We humans are not different. We, too, long for the sun during winter and enjoy each sunbeam. If the sun has warmed the water for the whole day, in the afternoon, the pike will move close to the shore in the side arms and flat bays. They try to get as shallow as possible. The more branched the side arms or bays are, the more attractive they are to pike.

Darker water warms up faster than crystal clear water. For this reason, a short check of the water color is advised. Secluded bays and arms cut off from the main water will usually be cloudier than open areas that are well connected to the main water. Those who have the choice should choose darker water sections.

If a sudden cold front appears, the pike quickly pull back into the deeper water or into the main part of the river. Winds from the north often bring the cold fronts. In these conditions, if the water body allows for it, the pike like to stay near the edges at depths of 10-16ft (3-5m). They still bite because they must feed. On windy days, too, the pike portray the same behavior. If the wind comes from the south, the weather does not necessarily cool down. Then the pike remain in wind-protected sections and bays, however, without staying too shallow.

6.3.2 Bait presentation

As spawning approaches, it becomes increasingly difficult to get the pike to bite. The feeding intensity decreases steadily during this time. Easy prey promises the most success at this time. With dead baitfish or slowly reeled artificial bait (flies, crabs, fish) we should be able to persuade one or the other pike to bite. In general, natural prey fish are low in numbers, so alternative food sources are important. If you like to go fly fishing during this time of the year, you can let off steam in the ditches, shallow bays and side arms. The winter vegetation offers plenty of space for fly fishing. Also, during this season, few anglers are fishing, so that the best spots are usually free.

The males feed more actively than the females. The aggressiveness of the males is now steadily increasing with the courtship of the females about to start. It is the only time in which the pike actively group themselves. If you catch one pike, you have a great chance of hooking a second one in the same spot.

We would like to ask again that you read this chapter with sustainable fishing in mind. Many smaller leased waters close for certain seasons. Respect these rules. If the pike stock is excellent, for example in the Müritz, then you can fish all year around.

6.4 The spawning season

Water temperature: 39-54°F (4-12°C)

Reproduction dominates spring. In Southern and Central Europe, the spawning season starts between February and April. In the northern latitudes, some spawning seasons last until June or July. It has been observed that across years, spawning tends to start at the same time, largely independent of weather fluctuations. Differences usually range from 1-2 weeks. Many pike populations seem to have their own fixed spawning season. Males can release sperm for a lengthy period of time. They stay at the spawning grounds longer than the females. The females seem to run on a different cycle.

The start of spawning is less dependent on the environmental factors to which other fish are subject. Nevertheless, the presence of sufficient vegetation is a must for successful spawning. If the days become longer and warmer, the plants in and outside the water also develop faster and form a good basis for the oviposition of the females.

Spawning itself is a short process. It is interesting to note that the more large pike (> 20“ (50cm)) inhabit a water body, the lower the fertility and thus the growth of the females. Biologically this makes sense. Less fertile females produce less offspring. It seems that the pike population does not only regulate itself by cannibalism. It would also be bad if pike could reproduce without limits. Imagine a water body that is teeming with countless voracious pike. We would have fun for one year, and then the lake would be depleted the next year.

No prey - no predator - no angler

The fertility of the females depends on a variety of factors, including temperature, nutrient richness, prey availability, vegetation, and the pike population itself. The extent to which these and other variables are related will require further research.

6.4.1 Spawning

Spawning takes place in 2-25“ (5-60cm) shallow water, directly at the banks or in flooded areas (marshland). Flooded areas, for example, areas flooded by rivers in the wake of the snow-melt, are regarded as top spawning grounds for predators. The higher temperature of these shallow areas also make them attractive. We should keep in mind that most of the water is still icy cold in March. 2-4°F (1-2°C) warmer water can boost the fish after a long winter. Cold periods at this time of year interrupt or slow down the spawning process.

Besides the temperature, the vegetation plays an important role. Depending on the latitude, we should be able to spot the vegetation quite well, because by the time spawning begins in March, most of the underwater plants have already grown. In lakes without flood zones, spawning does not start until sufficient plant growth.

The males arrive at the spawning grounds first. The water temperature is then between 34-54°F (1-12°C), depending on the latitude and water conditions. The larger females follow first. The smaller females arrive last. The ratio of males to females stands at a remarkable 3:1. That means that the males have to compete for the females. Fights are not uncommon. Many males are unsuccessful. For this reason, they stay a little longer in the spawning grounds, hoping to accommodate one or the other delayed female.

Figure 6.20—Spawning season (pike side by side)

Once a couple has paired, they swim side by side until mating is complete. The female lays eggs several times over a long distance. Usually, the females only spend a few hours or days at the spawning grounds. Males that have not yet mated stay at or near the spawning grounds for up to a month in the hope that one or the other female arrives late. Other males stay to rest before slowly starting to feed again.

For us, this means that it is worthwhile to visit the spawning grounds after the spawning season. Since the females have long since moved on again, we have to worry less about potentially hurting the long-term health of the pike population.

It is interesting to note that pike are not necessarily bound to their spawning grounds and may change spots from year to year depending on the conditions. If a spawning site is good, the pike will return for several years. An important exclusion criterion is the presence of bulrushes. Many studies have shown that pike rarely spawn in areas with bulrushes.

6.5 After the spawning season

Water temperature: 43-54°F (6-12°C)

Most pike will need to recover from the spawning season. Spawning costs a lot of energy. The pike now have to replenish their reserves. To recover, many pike lie close to the bottom, partly directly on top of the growing vegetation. Here they can recover.

Figure 6.21—A resting pike

It is not easy to predict how long the recovery phase will last. The females are subject to greater spawning stress than the males, so they need a longer recovery period. Feeding is at the bottom of the pike to-do list shortly after spawning. Medium-sized males are generally more active than larger males. They will gradually start to feed in order to make up for the many days without sufficient food.

Some pike stay close to the spawning grounds for a few days or even weeks during the recovery period. Others, and especially some of the larger pike, move into deep water immediately after a short rest. How long the recovery period lasts varies between pike. Some are fit again after 3-4 days, others remain quiet for 2-4 weeks.

There is a reason why some pike stay longer near the spawning grounds after the spawning season. Prey fish move to their spawning grounds after the pike. The pike actively look for certain structures to recover for the upcoming feeding.

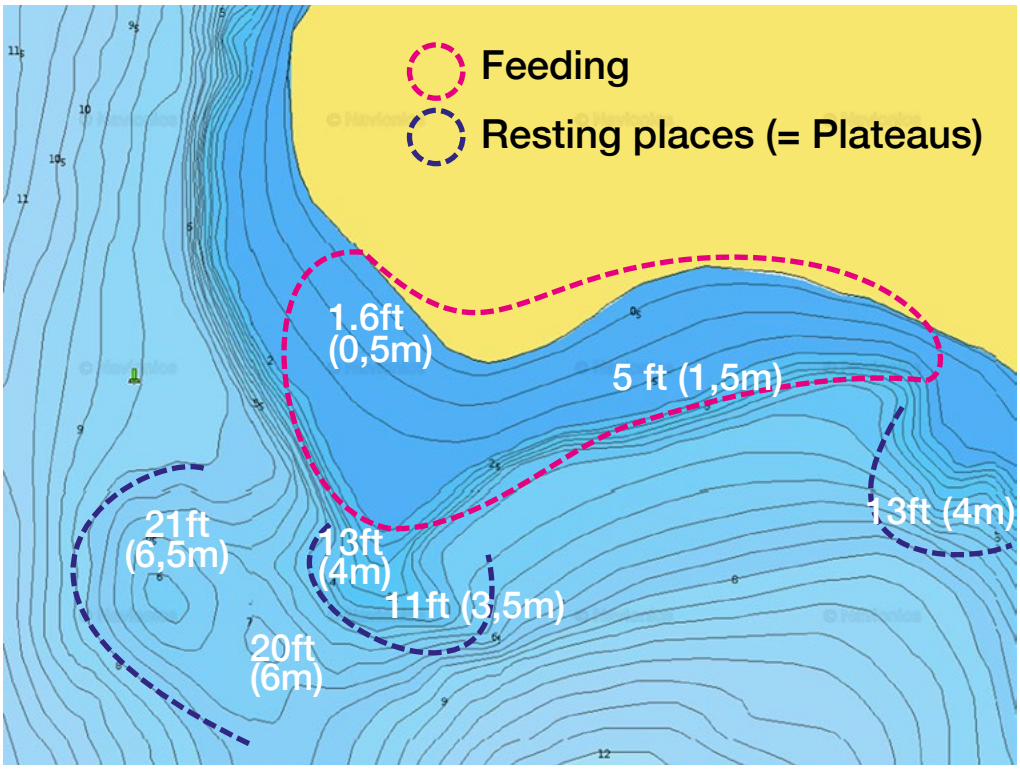


Figure 6.22—Plateaus as resting spots, close to wide bank edges

The best spots for the first active pike to feed are the warm and shallow bays. These attract many whitefish and perch. The medium-sized pike stay close to the edges and plateaus now, usually deeper than 10ft (3m). They only visit the shallow waters to feed—they will not miss the easy, careless prey on the shores. The pike gradually become more active and eager to feed.

Most larger pike will seek deeper waters to recover. Try to fish plateaus at a depth of 1-20ft (4-6m).

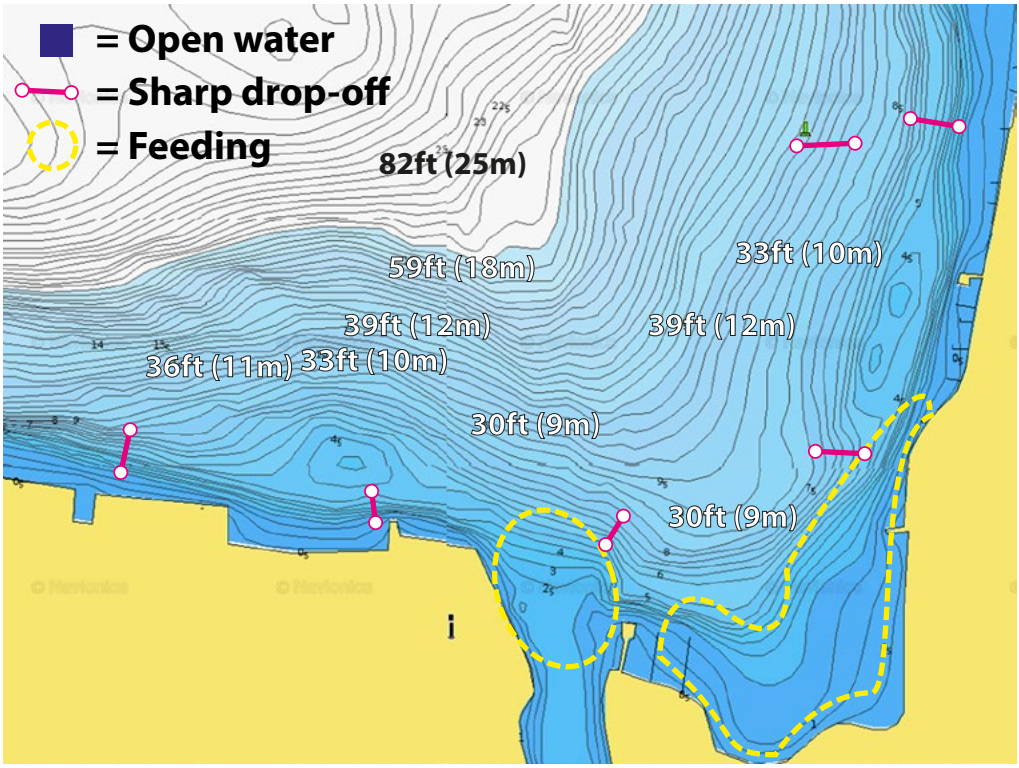


Figure 6.23—Plateau at the exit of a bay

Some bays are better suited to larger pike than others. If the shallow, wide bays have deep drop-offs, the larger pike can stay close to the feeding areas. These bays promise the best conditions for successful pike fishing at the end of this calendar period. The entrances and exits of the bays are always worth a visit. At these spots, the pike can quickly move between shallow and deeper water. In these conditions, we may even still be able to catch one or the other large pike from the shore.

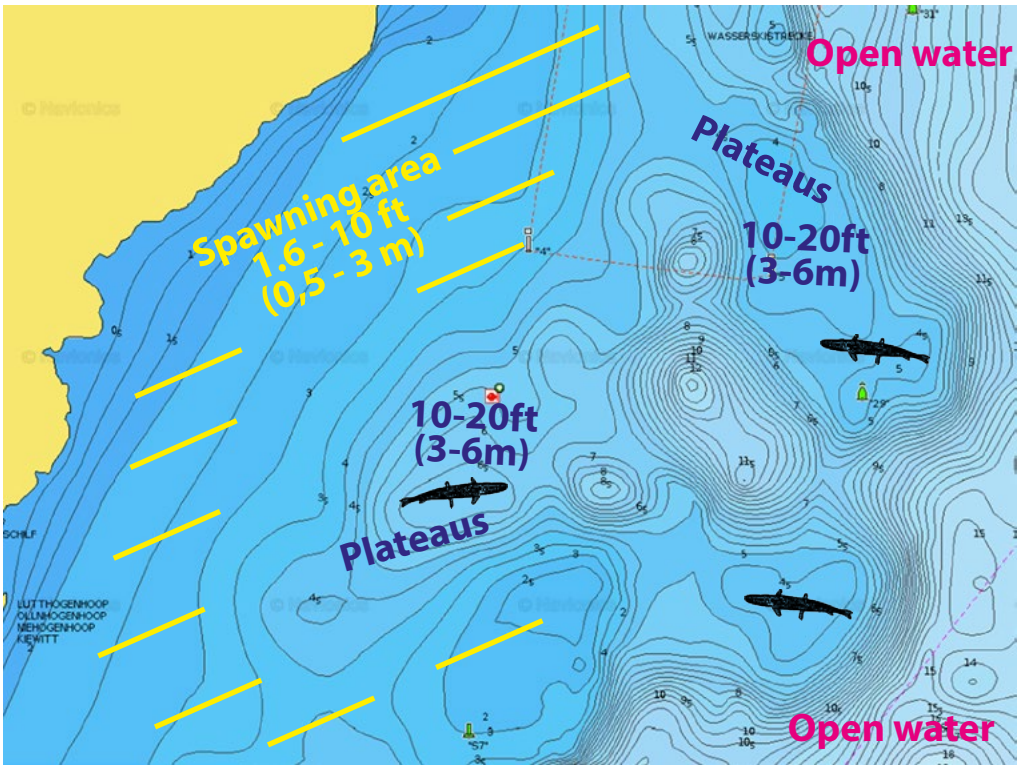


Figure 6.24—After spawning season - Super Hotspot

This hotspot is deserving of the name. It is located in the middle of a spawning ground that many fish visit. It is nice to see that a 16-20ft (5-6m) long hole is in the middle or close to the spawning area. Here larger pike find good conditions to recover and feed.

At the end of the recovery phase, fishing with artificial baits starts to pay dividends again. The pike are now about to enter an active phase of feeding. They are more and more attracted to structures on or near the plateaus.

6.5.1 Baits

The feeding behavior between pike still varies a lot. Fishing shortly after spawning, we can experience successful and slow days alike. In the early days, the pike will only react to easy prey. The dead baitfish is a favorite. In regard to larger pike, flies and crabs might bring some success.

You could also try spinners, wobblers, blinkers, and similar. Continue to reel slowly but mix it up from time to time.

Remember

As soon as they have replenished their reserves, the first pike head towards their summer quarters. Other pike stay behind for a while. The reasons why pike behave differently in this regard are not yet fully understood. The fact remains that it is impossible to make universally accurate statements regarding ‚the best hotspots' for pike fishing after spawning.

We always have to account for the context. Practice will show why some hotspots produce better than others.

The travel distance and time towards the summer quarters varies from pike to pike. In small and medium-sized lakes the pike can reach their territories in a few hours, while in reservoirs and rivers it can take many days. The swimming speed will also vary. Some will want to be first to get the best spots while others take their time.

Pike in spring – tips for shallow water

by Jan Pusch

In many waters, the pike season begins in May. In May, the predators stay mainly in shallow water. After the strenuous spawning, they need a lot of food to replenish their energy reserves.

Shallow regions warm up faster than deep zones. That is where vegetation and life develop. Brood fish seek cover in the vegetation and feed on animal plankton. Eventually, they come together to execute their swarm defense strategy against predators.

Here the pike finds easy prey. Through its green-brownish patterned color dress, it is well camouflaged. It is constantly lurking, ready for the next attack. The arrow-shaped body is designed for fast spurts, and when the razor-sharp teeth grab the prey, there is hardly any escape.

Nevertheless, it is not always easy for us anglers to tempt the pike to bite. Although pike are uncompromising in their attack and like to bite their prey multiple times, they are also sensitive, adaptive creatures. These predators do not throw themselves blindly at everything, which causes frustrations even among experienced pike anglers.

Especially in waters where a lot of anglers fish and the pike are small in numbers, the predators can be extremely difficult to catch.

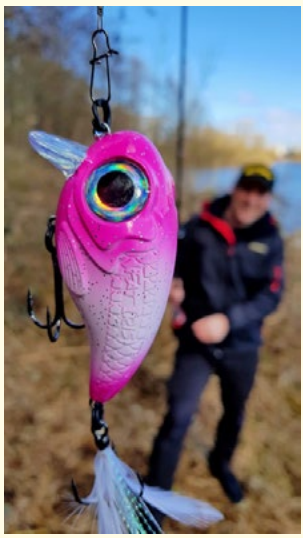
To catch pike today, we must rely on new tricks; we must use the most modern fishing gear, techniques and baits are required.

Fish shallow!

Because of its upturned mouth, pike often hunt upward. In shallow water you have to fish shallow! That is the only way the pike can see and perceive your bait.

Fish with realistic baitfish animations!

Pike react to optical stimuli and movements. Multiple split swimbaits like the BBZ have an incredibly realistic movement. Its movements in the water imitate those of a natural prey fish. The body is extremely firm and looks deceptively like a fish. To make the illusion perfect, all fins and the back are of a soft material. Because of the soft rubber, predators that attack the bait from behind, are less suspicious even when biting carefully.



Be flexible!

On some days it is ok to just cast and reel. On other days, letting the bait sit from time to time, brings more bites. Fish are flexible, so you should be too.

If nothing works, be aggressive!

If you are having a slow day, be aggressive! That gives the predators less time to think. The FAT IRIS is an aggressive flat water lure with extra large eyes. As you stop to reel in the bait, the distance bait floats on the spot for one to three seconds. Loud rattles produce vibrations and an aggressive deep sound underwater.

Yours, Jan Pusch

Name:	Jan Pusch
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Fishing since:	1977
Favorite fish:	European perch
Favorite bait:	Gummifisch
Waters:	Schweriner See

6.6 The end of spring

Water temperature: 50-63°F (10-17°C)

In spring, vegetation blossoms and underwater life develops explosively. Another change of location is imminent for the pike. After recovering from spawning, the first pike make their way to their summer habitats on the banks of rivers and standing water bodies. All this happens just prior to the spawning season of the prey fish. However, that time has not arrived just yet so pike are still scattered here and there. Yet, one thing unites them all: They are feeding more and more actively, and thus stay in close proximity to their prey. In the cool spring, the best spot to find prey and predator is warm water.

6.6.1 Warm water, an indication of a hotspot

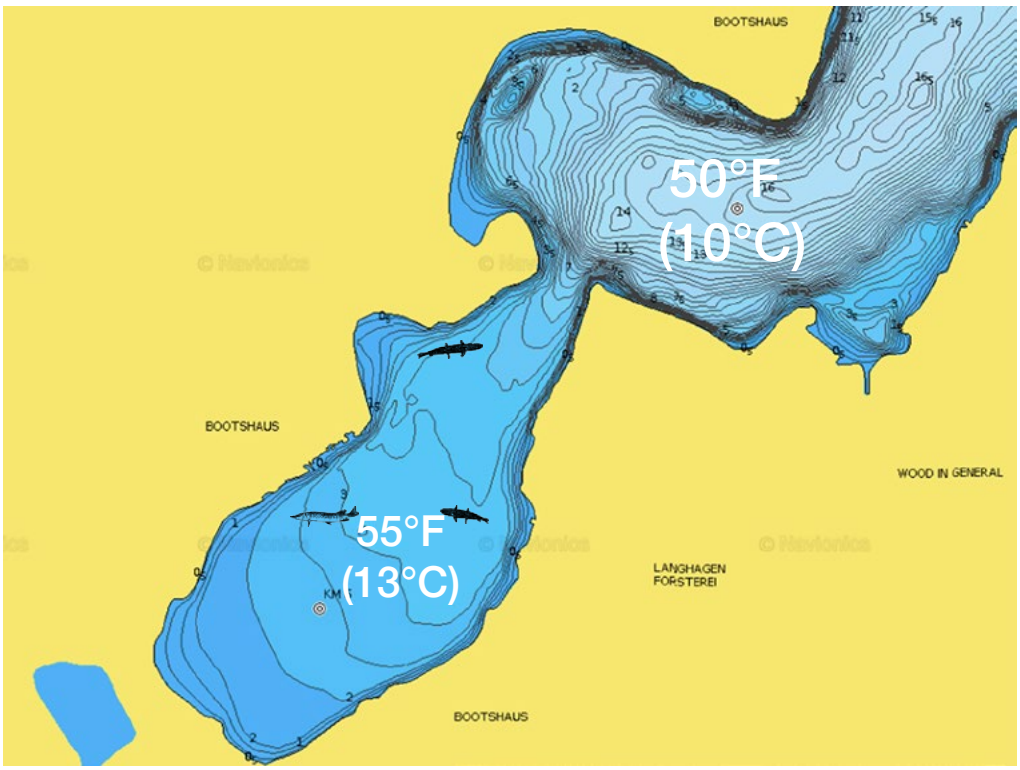

Figure 6.25—Warm bay with narrow access

In spring, the water finally starts to warm up sustainably. At an average water temperature of 50°F (10°C), most fish move towards the warmest region in their environment. Flat bays become a good hotspot. They warm up faster than areas with deeper water. If the bays connect to deeper water only via a narrow passage, that is perfect.

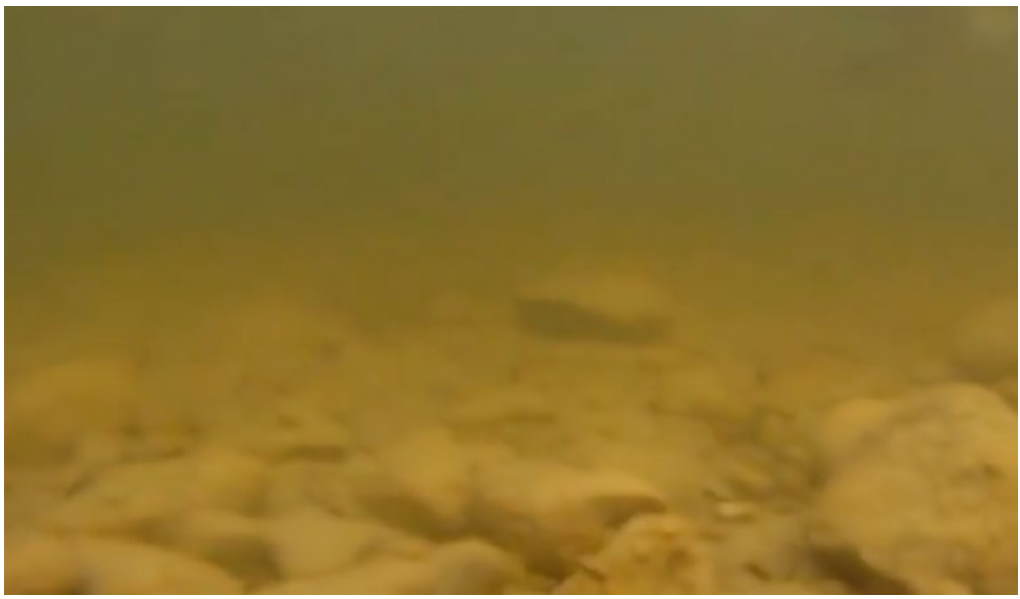

Figure 6.26—Turbid, brownish water

The water color also plays an important role. Turbid or brown water warms up faster than clear water. Many fish move to these waters. We can spot turbid and/or colored water quite easily. If you want to be certain, you can employ some technical aids to find the warm parts of the water body.

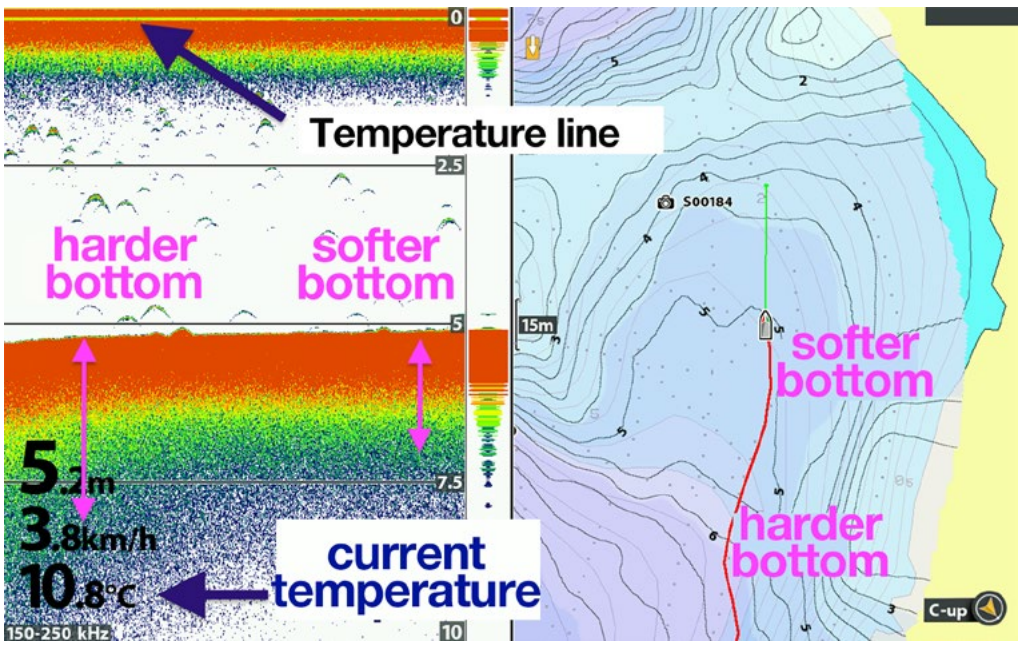

Figure 6.27—Fish finder temperature line and soft bottom

Here we see a typical picture of a 2D fish finder. We can see the temperature line at the top. It shows us the change of the water temperature over time. If you set a slow scroll speed, you can compare the temperature changes of the last minutes. In our example, you can find the current water temperature in the lower left corner.

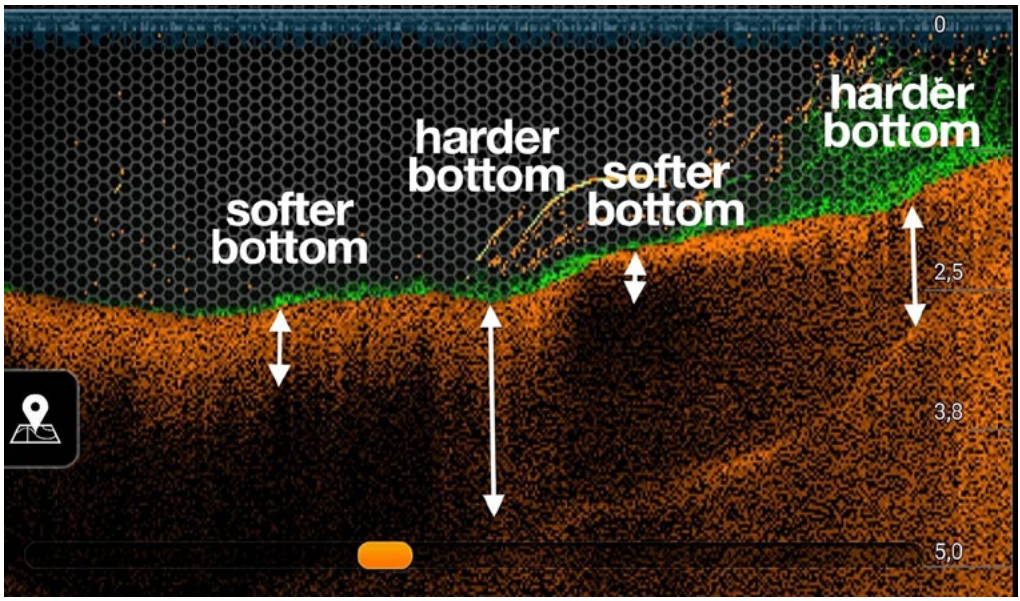

Figure 6.28—Deeper, hard and soft bottom

The structure of the bottom can also aid us in finding the warmest water. The display gives us an indication of how hard or soft the soil is. Soft soil is always a good indicator of turbid water. A muddy, soft bottom will cause the water to turn brown and to heat up quickly. If the bottom is soft, we can see a single, narrow line on the display.

6.6.2 Cold spell

Spring is never stable. Again and again, we experience cold spells. As a result, water temperatures can drop rapidly and slow down the explosive development of life under water. If the water temperature drops, the fish adjust immediately—the pike will bite much less in these conditions.

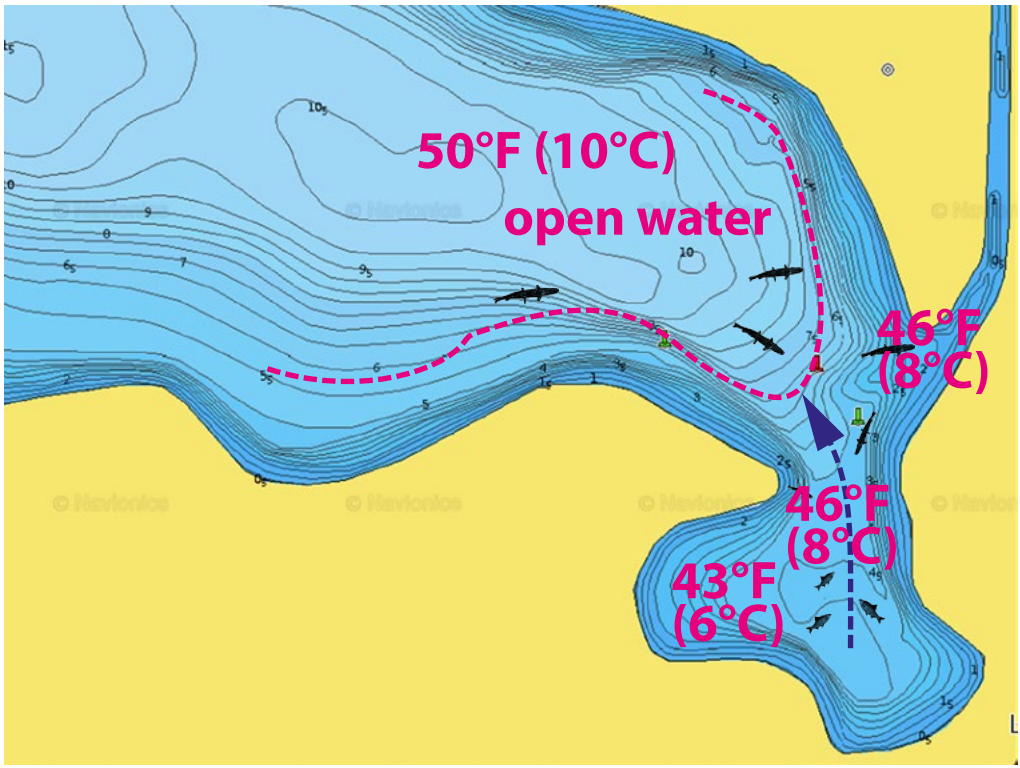

Figure 6.29—Cold spell (fish leave bay)

Cold spells change the temperature in the shallow bays and narrow side arms quickly, causing the fish to move back to the deeper water. Remember, the larger pike are waiting near the edges and are ready to strike as the fish from the shallow waters pass by. Bingo!

If a cold spell lasts for a few days, we should adjust our bait presentation accordingly. Move your baits slowly. The pike‘s metabolism has adapted again, and everyone is moving a tad slower. It is hard enough to catch pike in falling temperatures, but if you move your bait too fast, the odds of you hooking a pike drop close to zero.

Once the cold front passes, everything changes again. The pike gradually start to feed again. Predators and prey move back towards the shallower areas.

A word on cannibalism: If a prolonged cold front hits at the wrong time, the spawning of many prey fish may get delayed—in the worst case, many larvae die. That can cause cannibalism to erupt among the pike population. If there are not enough prey fish, the pike have to look for alternatives.

6.6.3 Wind in spring

It is normal for short and longer wind periods to occur in spring. Knowing of this plays into our cards because the wind has an influence on the water temperature. Warm winds increase it and cold winds reduce it. However, that is only the case if the wind

persists for several days. Water in itself is a good heat accumulator so that a one-time wind has little effect on the temperature. If it is windy over a period of two to three days, that causes a cooling of the water surface and the different water temperatures mix. Shallow waters are of course more susceptible to wind than deeper water bodies.

Figure 6.30—Quiet bay surrounded by trees

VTherefore, wind-protected bays can be great hotspots for pike fishing. These warmer bays are home to countless prey fish. The wind loses a lot of momentum if it cannot hit the water surface directly. Houses, trees or other large obstacles on the shore protect these bays, attracting prey as well as predators. If you observe the surroundings on the banks, you should be able to estimate quite reliably how a cold or warm wind may affect these bays.

Figure 6.31—Big bay, wind and waves

The size of the shore areas also plays an important factor in how much the winds affect the water temperatures. The wind sweeps across smaller, separate water sections more quickly than over larger water sections. The result is a strong wind-induced current in these spots.

Remember

The wind can be a decisive factor as to whether prey fish and predators reside in a certain spot. It makes sense to analyze the wind patterns before you head out. We use apps such as Windfinder. With these apps, you can analyze the strength and direction of the wind over several days. That should give you a better picture of the situation on the water.

6.6.4 The spawning season for prey fish begins

Figure 6.32—Baltic Sea bay at Rügener Bodden

When most other fish start to reproduce, the pike spawning process is long over. A time of abundance begins—nature has arranged it quite neatly for the pike. Common roach, bream, and common rudd spawn in Germany mostly in April and May. These spawning forage fish are inattentive and easy prey for predators. Pike will not miss such a meal. Those wading are in luck, meeting large pike right near the shore.

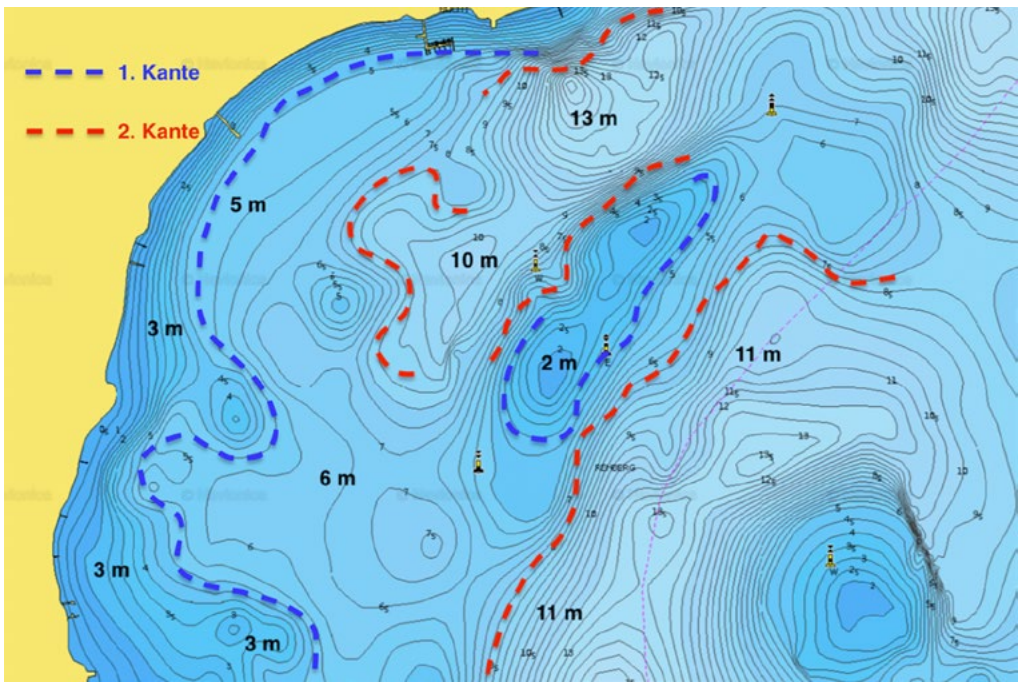

Figure 6.33—Shallow bay and edges towards the depth

During these months, large pike occupy the edges of deeper waters. From here, they start their raids. All access points to these bays are likely starting points for pike hunts.

Those who find a way to reach them may encounter hungry pike. However, success is not guaranteed, as our baits are in direct competition with hundreds of spawning prey.

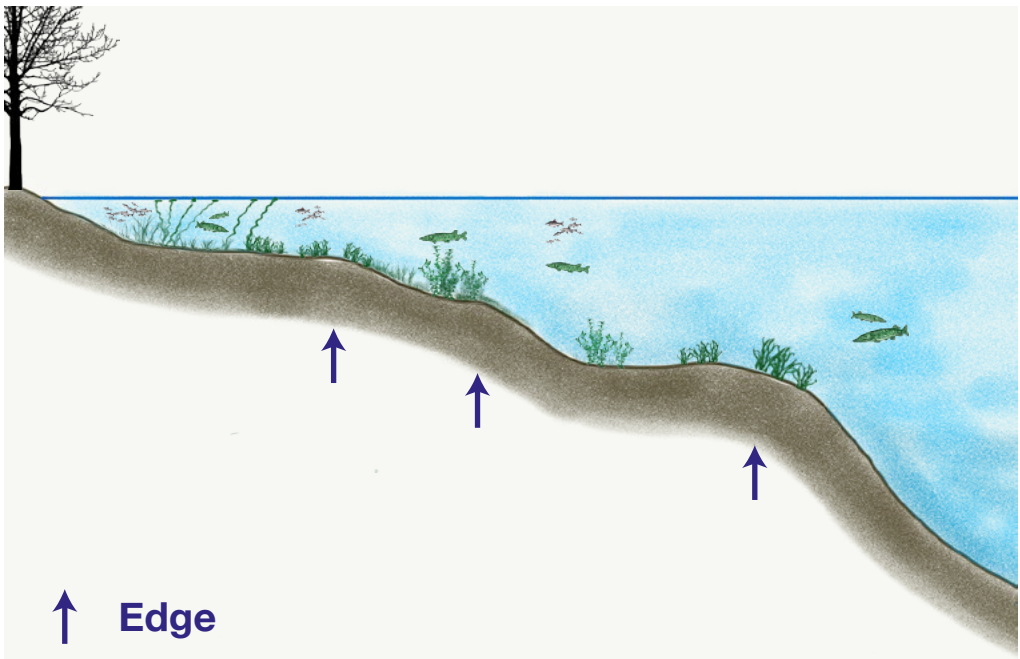

Figure 6.34—Shallower, larger shore area and edges towards the depth

Pike do not only patrol the bays during those months. Spawning fish also occupy wide shore-zones. Remember, whitefish in polytrophic and eutrophic waters constitute the largest portion of the fish population. Therefore, these fish require much larger and more numerous spawning areas than predatory fish. As a result, their requirements on spawning areas are not as specific as those of pike.

6.6.5 Bait

When pike hunt between the countless prey fish in the shallows, our baits must attract attention. Color contrasts of red and green can fulfill this purpose. Vibrating spinners or rubber shovel tails can add to the allure of our bait.

Fish are now increasingly on the menu, and other prey species become less important (see table „Alternative food sources“ on page 55). How quickly the pike adjust to prey fish depends on the availability of those.

Generally, we can assume that if the pike population is well developed, the prey fish population will be too small to feed all the pike. If that is the case, some pike will hunt instead for flies, crabs, young ducks, and whatever else might present itself. Cannibalism is also a topic again.

6.6.6 Slow adjustment of the hunting strategy

At the end of spring, the young underwater vegetation offers a new habitat for the pike. They hide in the vegetation, which still has some open spots—it is slowly becoming denser and denser. Especially the large pike use this time to hunt for prey from vegetation—now, they can still move freely. Most pike have claimed a territory now. Many are changing their hunting strategy from active stalking to lurking.

Figure 6.35—Pike in hiding

The pike is a master in ambushing its prey. We call this type of attack „lurking." Many pike wait in a hiding place and ambush their prey at a suitable moment. Their body is optimally adapted to this strategy.

Of course, not all pike launch this type of attack. However, most of the time pike are quite successful with this strategy, with their body color serving as the perfect camouflage. With increasing plant growth, it gets easier for the pike to hide. Attacking from an ambushing position promises the best odds for a successful attack. During this time of the year, an increasing number of pike rely on this strategy. Pike hunt as individuals. Some will become more active, others stay less active.

6.6.7 Territories

Cannibalism is a reality among pike. Fixed territories minimize the likelihood of pike colliding. It saves them from becoming prey themselves. In the spring, there are countless pike near the banks. Especially for the thousands of hatched pike, cannibalism is an ever-present risk. Larger pike run into each other less often. However, during

spring, larger pike have bigger territories—their radius of action is bigger. As a result, occasionally it happens that a large pike wanders into the territory of a pike the same size.

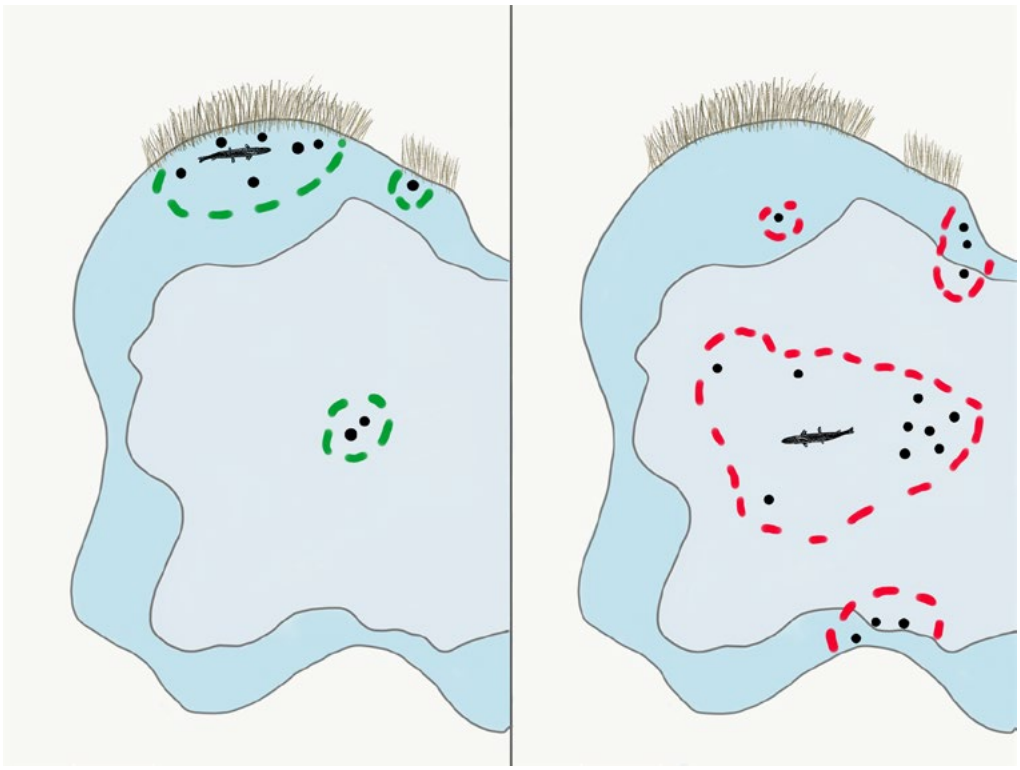

Figure 6.36—Pike territories vary greatly

Do not assume that the boundaries of the territories are clearly defined. There are not invisible entrance gates of doormats with the slogan „Here I hunt.“ As a matter of fact, pike territories overlap quite often. Also, some pike like to switch their territories regularly. If a pike ends up on a hook, other pike will scramble to claim the territory quickly. For this reason, there are some spots where we can always encounter pike. We call those areas „hotspots.“

When pike cross paths, some look for conflict while others try to escape. Therefore, not every meeting of pike ends with a fight or cannibalism.

Whether a pike attacks, usually depends on the particular pike. If the one views the other as an intruder or as easy prey, it is likely to attack. Food competition also plays a role, which is widespread starting in spring. Some pike, likely the larger ones, will try to contest others for their prey to preserve energy.

Remember

Spring brings about a lot of changes to the life of pike. While they emerge weak and without appetite from the spawning season, that changes in the course of the following weeks. Food on the banks is as concentrated and abundant as it will never be again throughout the year. The motto is: „all you can eat.“

With growing underwater vegetation, the pike‘s hunting strategy changes. From hunting actively, sometimes over long distances, the pike turn into efficient predators in summer. Protected by edges, vegetation and other structures in the water, lurking becomes their favorite hunting strategy.

These changes in hunger, prey availability, and the pike‘s hunting strategy affect our fishing. To be successful in spring, we need to adapt our baits, bait presentation and actively look for the best hotspots. Spring is an interesting period for pike fishing.

6.7 Summer

Water temperature: 59-70°F (15-21°C)

In summer, the growth of vegetation and many living creatures reaches its peak. The aquatic plants are now almost fully developed and often form a dense thicket under water. Summer is the time of continuity. The days are long. The weather is mostly stable. There are fewer cold fronts, strong winds or storms. Mild breezes dominate the weather. Accordingly, pike become creatures of habit, not changing their behavior often. Depending on the latitude, the summer begins sooner or later. In Germany, summer arrives in the middle/end of June, whereas in Scandinavia, people usually have to wait until July.

6.7.1 Feeding

The pike prefer to be passive during the long days, sometimes hunting and feeding more, other times less. In hunting, the light intensity plays an elementary role for the pike in summer, especially in waters with good visibility. Pike feed at different times depending on the water. In clear waters, pike tend to wait until dusk. Hunting at dusk promises the best odds in these conditions.

During sunset, the pike‘s body is almost indistinguishable in the water. The camouflage gives the pike a decisive advantage. Pike can stalk their prey up to three times closer at dusk than in daylight. Every false attack costs the pike unnecessary energy. The general mood of most pike, especially the larger ones, changes greatly during the course of the summer. In the early summer days, pike still feed actively. That changes with increasing water temperatures. The feeding activity continues to decline as the summer progresses. The feeding phases tend to be short rather than long.

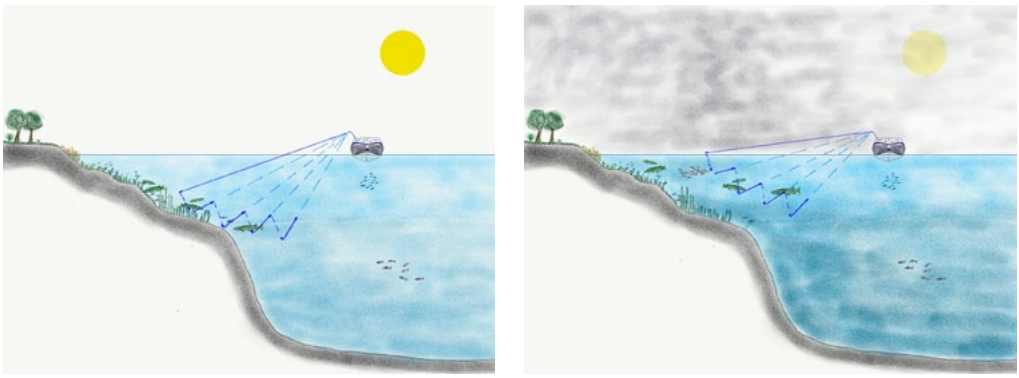

Figure 6.37—Sun and clouds in comparison

However, external factors can irritate the pike. Weather-related changes can activate the pike for hunting. If the sun disappears behind clouds, the light conditions resemble twilight. With cloudy skies, starting at a depth of about 10 feet (3 meters), the light intensity is comparable to conditions at dusk. That change can cause one or the other spontaneous pike attack. Make sure not to miss these opportunities.

6.7.2 Weather change

Everyone should study the changing weather conditions before heading out on a fishing trip. Even though summer is a period of constancy, the weather always changes. If the weather has been stable for a few days, fish tend to not display any unusual behaviors. So before you head out, check whether the weather has been stable for the last 2-4 days. You can consult different weather apps or websites. We use the app Weather Pro. Its air pressure function shows us how stable the weather has been.

With slowly rising air pressure, the weather tends to be better. If the air pressure rises quickly (more than 1 hPa/hour), we might have a weather change, likely with stronger winds, on the horizon. The wind can strongly affect the water. In summer, the sun stands high, and the light can penetrate deep into the water. Waves can break the light and cause sudden darkness under water. That may encourage one or the other pike to feed. Cloudy and often humid weather provides the right light for the pike to hunt, encouraging them sometimes to be active during the day as well. Clouds often provide the necessary stimulus for the pike to feed.

If the air pressure drops, the weather can become uncomfortable. Again, a falling barometer indicates a change in the weather. Usually, it results in the weather getting worse. A sharp drop in air pressure suggests a storm. If the low continues, it becomes cooler, and we will have a harder time fishing for pike.

In turbid waters, pike hunt more often throughout the day. Depending on the turbidity of the water, they are camouflaged well. In these conditions, clouds can have the opposite effect and interrupt the feeding. Once the sun shines again, that hunting conditions improve once more, triggering the pike to hunt again. In sunny weather, pike can easily distinguish the contours of the prey fish, and of course our baits.

6.7.3 Northernmost latitudes

In some areas of the northern hemisphere, it does not get truly dark in summer. In Sweden, Finland, and Canada, for example, the days are particularly long. On clear and sunny days, the pike will restrict their feeding to the few hours around dusk.

However, pike cannot always wait for dusk to arrive before they start feeding. Some of them follow a different rhythm. Cloudy skies can result in good pike catches in the late afternoon or evening. Many pike use short cloudy periods for feeding.

6.7.4 Hotspots for pike

In summer, the underwater vegetation is pronounced. Pike actively search for good hiding spots with enough free space to hunt. Larger pike, leave the thicket to find more space, allowing them to hide but also to have a clear view of the surrounding area.

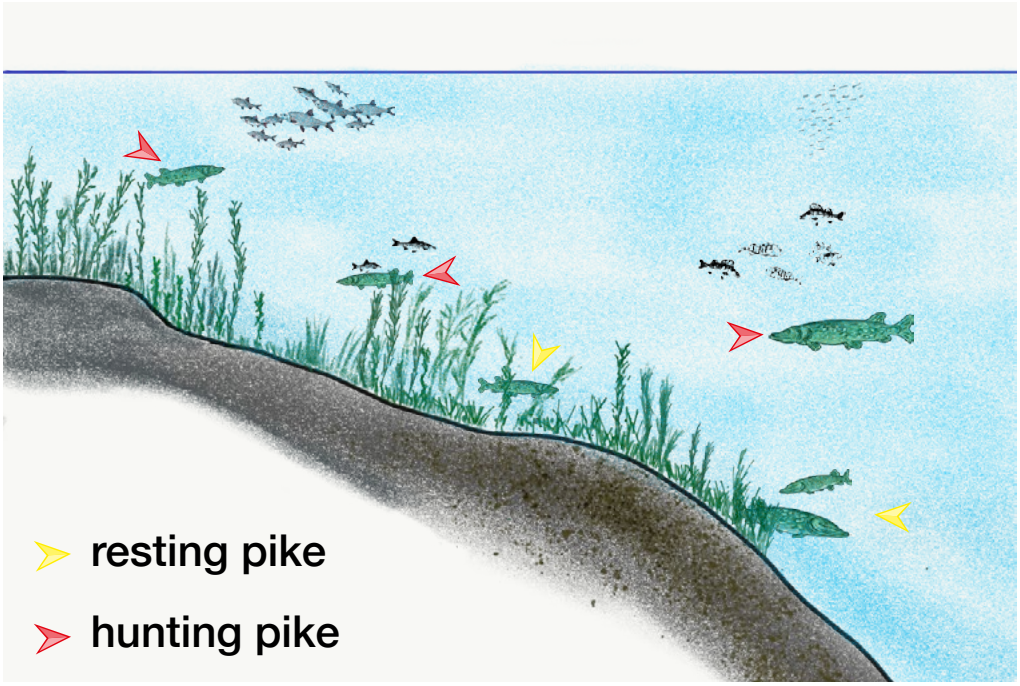

Figure 6.38—Pike above the vegetation with roaches as prey

In dense vegetations, the pike tend to stay above the vegetation. There they remain between the tips of the underwater plants. For the prey fish swimming above, they remain invisible as their greenish, dark and spotted body merges perfectly with the environment.

From this position, the pike is particularly interested in shoals of fish such as roach. Shoals tend to stay higher in the water column, and the pike can attack from below to snatch individual fish.

Many adult pike visit depths up to 13ft (4m). Most pike remain in an ambushing posi-

tion. That means they are actively looking for cover. That and the fact that pike like to restrict their hunting to their respective territory, has an essential influence on how we should present our baits.

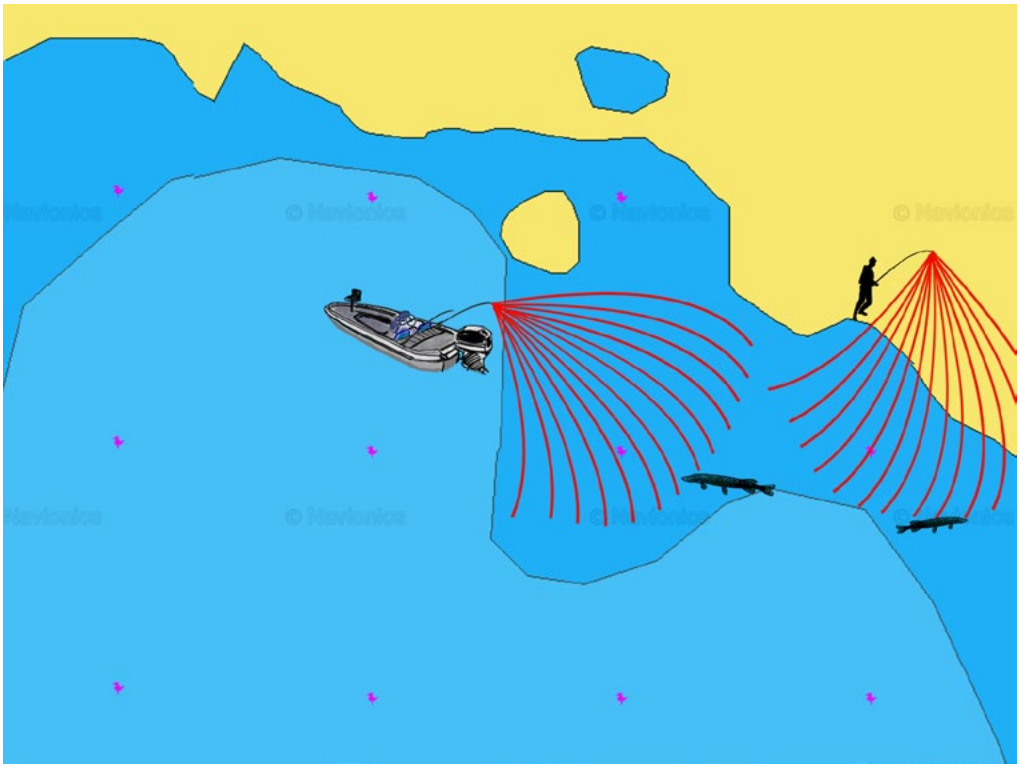

Figure 6.39—Strategic fishing of fishing hotspot | boat and shore

Since most pike prefer to hunt from an ambushing position and wait for the right opportunity to strike on easy prey, we have to fish strategically to get as close as possible. If there is just a 6-foot (two-meter) distance between our bait and the predator, the pike will likely ignore it.

Remember

A large area with abundant vegetation might be an excellent hiding spot for pike, but that does not mean that you can catch them there. Especially in summer, some areas are overfished, causing the pike to bite much less. So it can make sense to visit smaller and less attractive spots. We know that in summer, some pike restrict their territory to 30 x 30 feet (10 x 10 meters). Meaning, there should be plenty of spots where you can catch one or two larger pike.

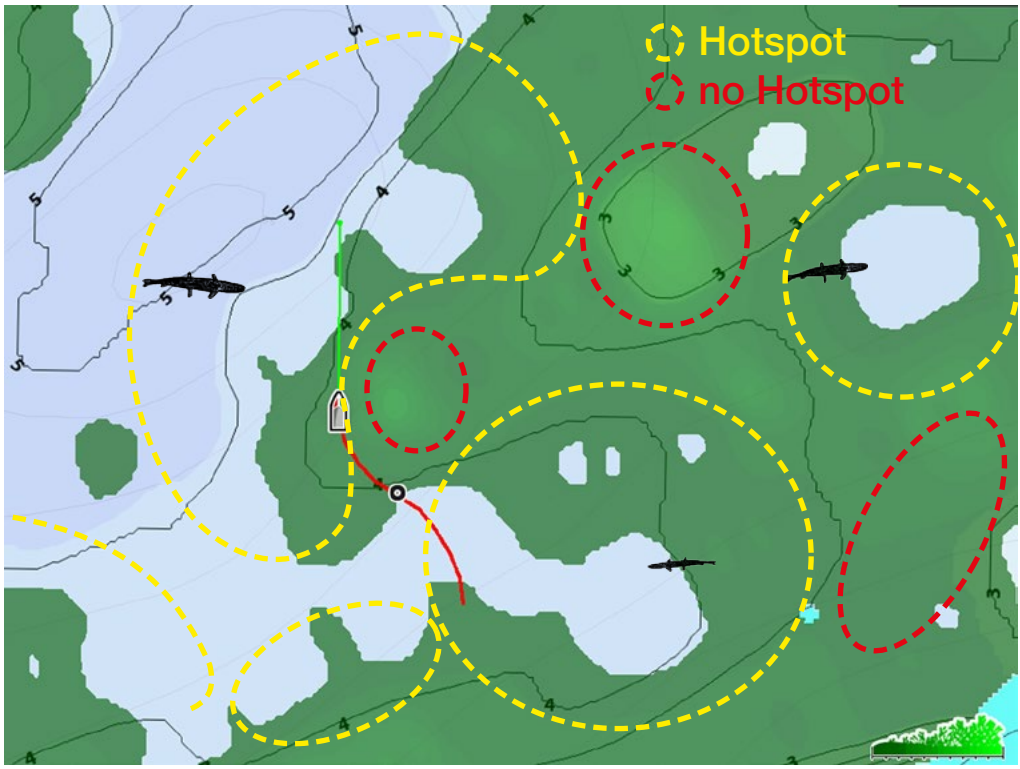

Figure 6.40—Plant density and hotspots in summer

Larger pike prefer vegetation that is not too thick. They need sufficient space for hunting. They rarely hunt in the midst of dense vegetation, as this restricts their sight and agility. Additionally, dense vegetation offers the small prey fish cover. In case of an attack, roaches can hide quickly.

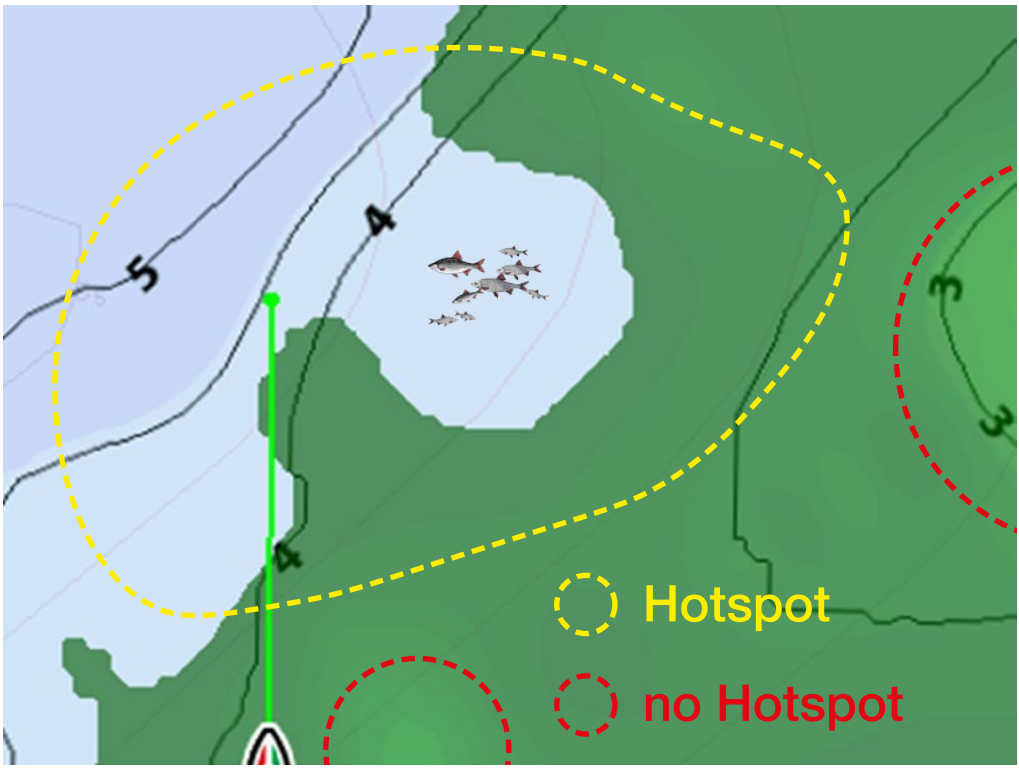

Figure 6.41—Pockets in the vegetation

Pockets that are not overgrown or only slightly overgrown are somewhat good hotspots for pike fishing. Single prey fish or whole shoals might stay here so that the pike can spot them in the free space from cover. On the other hand, dense vegetation that borders on loose structures, are an ideal hotspot. The dense vegetation is home to a lot of prey fish, some of which sometimes visit the open space.

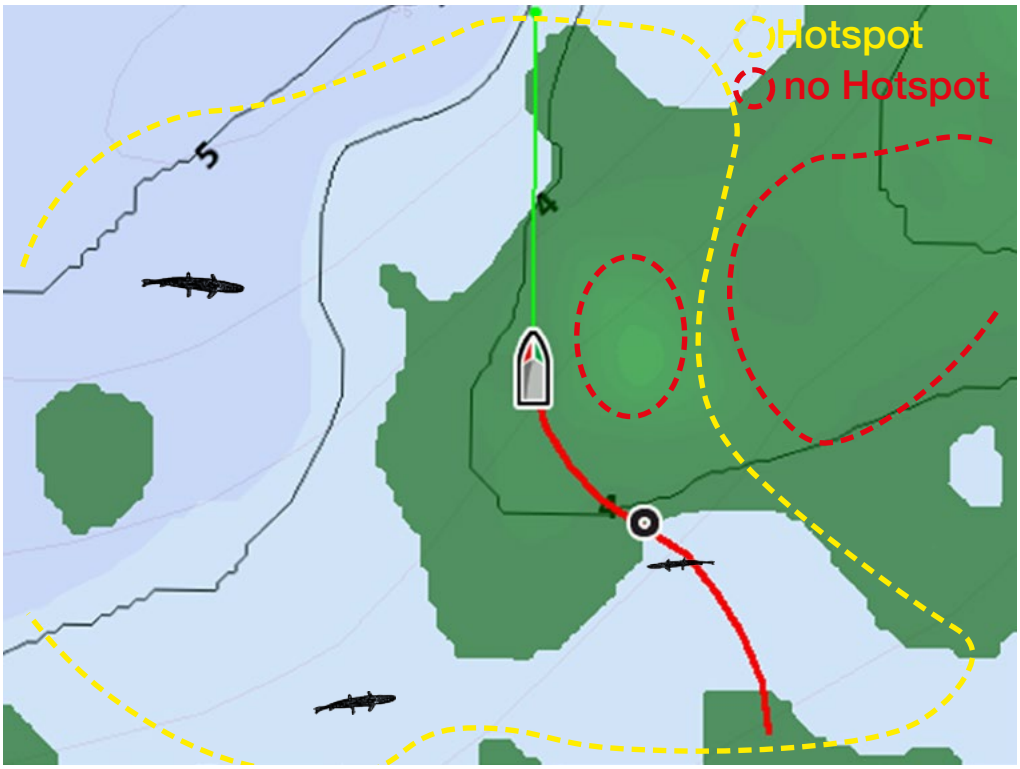

Figure 6.42—Opening in the vegetation

Openings in the underwater vegetation are also key summer spots. Pike have plenty of space at the edges. Some prey fish are in the open water, near the vegetation, others move between vegetation and open water. Over a large area, one or the other pike will find plenty of opportunities to hunt.

The visibility in a water body in summer can be quite different from other seasons. Not only underwater plants, but also plankton are often abundant in summer, which leads to more turbidity.

6.7.5 Water bodies with a visibility of more than 3ft (1m)

In order to hunt successfully, pike look for spots with sufficient visibility. Depending on the prey fish species and the turbidity of the water, visibility ranges of about 3ft (1m) are optimal. In such conditions, pike can leverage their great eyesight. First, they spot their prey, then their instincts calculate the attack. The prey should be close to make an attack worthwhile. Longer distances of more than 3ft (1m) rarely lead to success.

Of course, we should not generalize, as pike do not only use their eyes to detect prey but also their sideline organ which picks up vibrations. And sometimes it is enough for the pike to capture the contours of the prey fish/bait. Therefore, even in murky water, the pike might launch an attack if the target is not too far away.

6.7.6 Waters with a visibility below 1.5ft (0.5m)

In murky waters with visibility below 20“ (50cm), circumstances force us to fish strategically with small gaps between casts. We have to get closer to the pike as the visibility is limited. The pike itself now requires less cover as the turbid water serves as the perfect camouflage. The pike can wait until the prey gets close. Therefore, the pike can hunt well both from the vegetation or the open water. Good fishing spots are no longer restricted to areas that provide cover. The general availability of prey plays a more important role.

6.7.7 Shadows

The pike can hide well in the shadows of structures such as bridges or walls. The sunlight does not hit the water directly so that conditions underwater are a lot darker. Due to its color, the pike is invisible in front of dark backgrounds such as dark walls. In this position, it becomes difficult for prey fish to spot the predator.

Figure 6.43—Bridges provide shade

6.7.8 Cover

Figure 6.44—Trees that protrude into the water provide cover and shade

Behind and between structures the pike finds cover from which to launch its attacks. The pike becomes invisible between branches or trees like willows that protrude into the water. It can wait for the right moment and then strike. Additionally, these hotspots provide a lot of shade.

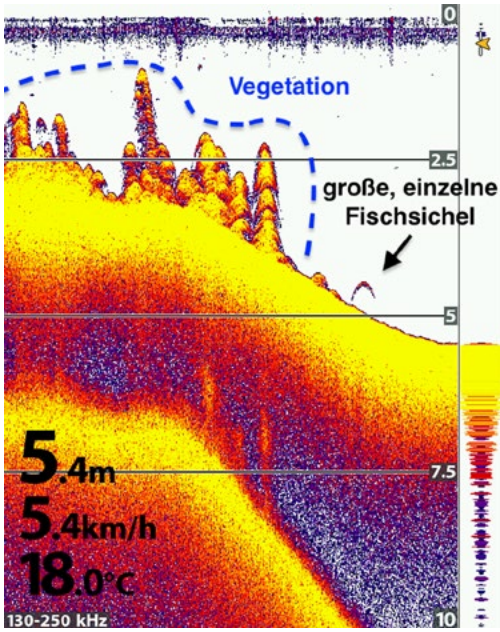

Figure 6.45—Vegetation on a fish finder image

Figure 6.46—Deeper and the vegetation

Now, it is important for anglers to know their waters. Underwater vegetation is not evenly distributed so that the areas in the shallow water are differently overgrown. If you have a good overview of the vegetation, you have a clear advantage.

In clear, shallow waters, it is easy to observe the vegetation with the naked eye. You can explore the immediate surroundings from bridges or boats.

If you want to fish in more distant places, you need technical aids. Mobile fish finders can help here.

Anglers fishing along the shore can use these aids to search for areas with less vegetation. You can also save spots which makes it easy to find them again in the future.

Remember

Good hotspots for pike fishing in summer are sporadically overgrown areas, sunken branches, and trees, willows or bushes that protrude into the water. Even man-made structures such as bridges or walls offer shady spots, which the pike can use as cover, depending on the angle of the sun.

6.7.9 Baits

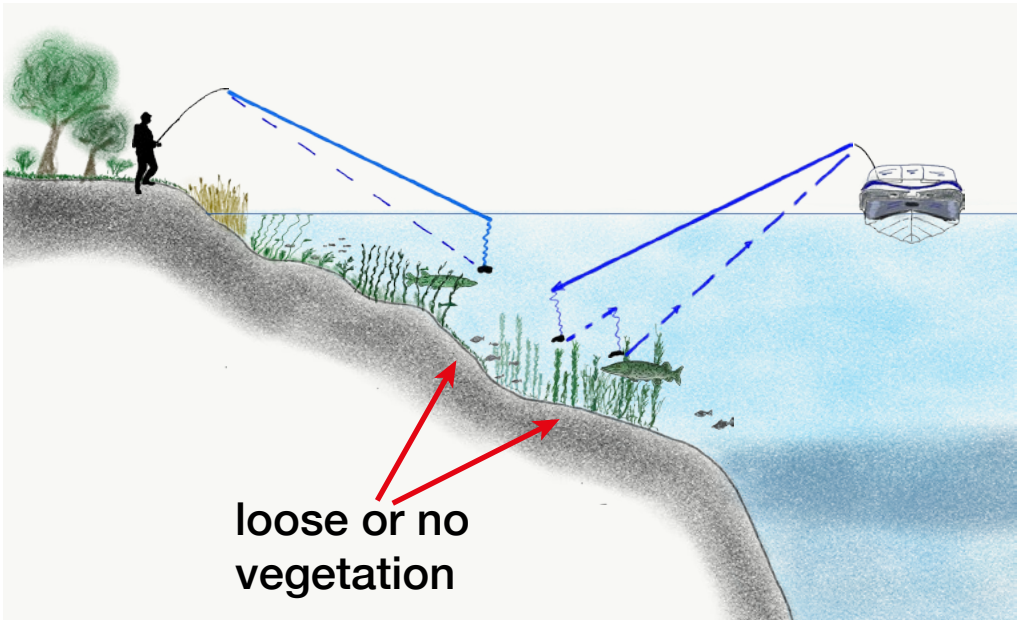

Figure 6.47—Placing baits between plants from the boat or shore

In eutrophic and polytrophic waters, whitefish baits, which you pull across the vegetation, appear as easy prey to the pike. You can move these baits quickly or slowly. A change from slow to fast can simulate a fleeing prey and attract the pike additionally.

It is important to have a good understanding of the underwater vegetation to find areas with some open spots.

If predatory fish such as perch are frequently on the menu in mesotrophic waters, we should offer them to the pike slowly at various depths. Perch flee less frequently, so do not move those baits too quickly. You may also try to maneuver them through the underwater vegetation at the edges.

6.7.10 Territories, cannibalism and food competition

Most pike move into their summer territories at the start of summer. The territories vary in size depending on the water body and water section. Small areas of a few hundred square feet / square meters, with dimensions of 33 x 33 ft = 1,000 sqft (10 x 10 m = 100 sqm) to 160 x 160 ft = 25,000 sqft (50 x 50 m = 2,500 sqm), are not uncommon.

What seems small to us, makes great sense for some pike: The prey is abundant in many shore areas until autumn. Additionally, many pike with rather small hunting grounds minimize the risk of falling victim to cannibalism. Also, smaller territories reduce the likelihood of food competition, although it always remains present—another pike might still invade.

Pike react differently to their conspecifics. While some retreat, others attack uninvited

guests. We can use these defensive instincts to our advantage. If you disturb one or the other pike with your bait, you might trigger an attack that is not hunger related.

6.7.11 The pike's metabolism

The pike's metabolism is running at full throttle at a water temperature of about 66°F (19°C). Consequently, the pike have to take in more energy. Pike hunt more often at the beginning of summer than in most other calendar periods, however, always in proportion to their energy requirements. For most pike this means that they will not feed more than 2-3 prey fish over a 2-4 day period. If we assume a success rate of about 20-25% based on previous findings, then a pike will need 4-5 attacks to catch prey. In between attacks, they might take short trips through their territories but more often than not just float motionless in the water.

No matter how big their territory, pike like to wander around. However, this does not mean that they are on the move all the time. On the contrary. Long periods of immobility often follow short movements. In summer, researchers have detected that most pike do not move for more than 10-150 ft (3-47m) per hour. From our point of view, that is not a long distance, supporting our assumptions that it does not pay to change location every 20 minutes. Instead, we should fish each spot strategically. If we are in the right spot, a pike will be there. So, if the location is close to the shore, has a depth of no more than 3-13ft (1-4m), with many prey fish and vegetation around, the odds are quite significant that we are in a pike's territory. Maybe the local pike does not like our bait or is not hungry. We cannot change that. However, we can stimulate it with different measures. Vibrations or rattles can do the trick. If you use a pike bait, you might trigger cannibalistic or territorial instincts. Uninvited conspecifics are never welcome.

Some studies assume that pike move most at a water temperature of about 66-70°F (19-21°C). Of course, we have to consider this statement with a bit of perspective, because the activity level is not perfectly correlated with the water temperature. Likely it is better to speak of behavior patterns that apply to one or the other pike.

Looking at these behavior patterns, we can state that the pike move most during summer, especially at dawn and dusk. During the day, pike like to stay close to the shore, while at dusk they move to the edges. Larger specimens (> 30“ (75cm)) usually stay further from the shore than medium-sized or small specimens. They also cover longer distances.

6.7.12 The open water

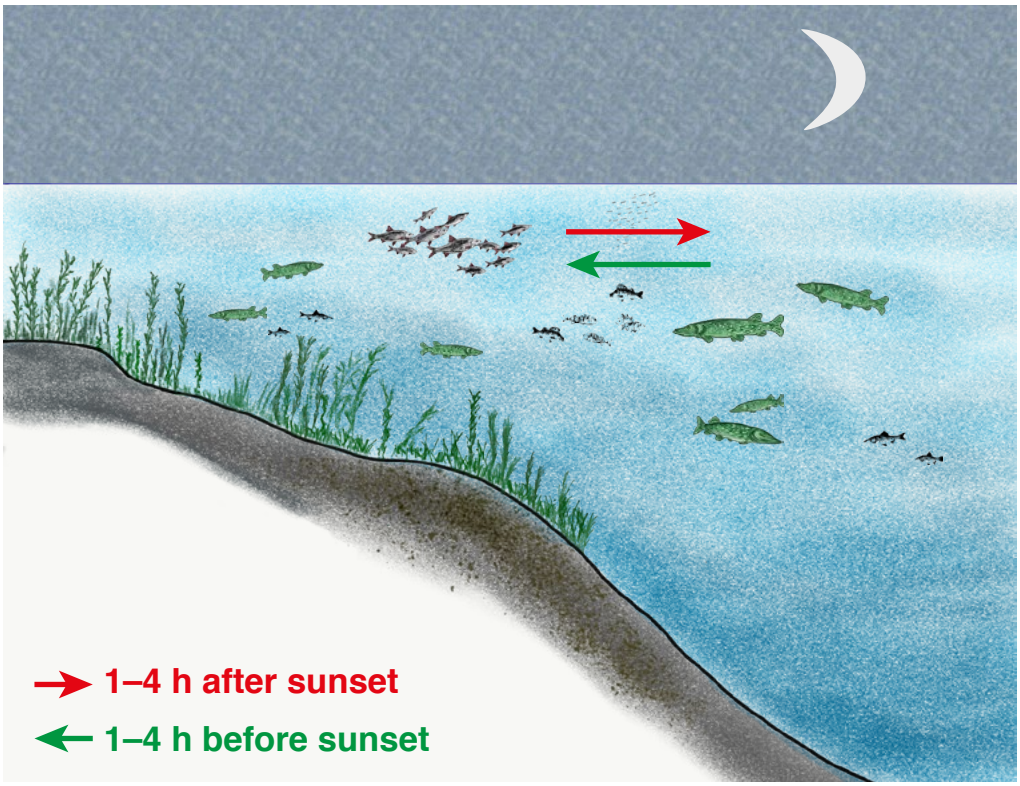

Figure 6.48—Edges, pike and roach at dusk

The reason why pike move to the edges at dusk more often in the summer is that schools of bait move into the open water in the evening. Many roaches, for example, feed on the rising zooplankton in open water at night. The darkness provides cover to reduce the risk of falling victim to predators. Instinctively, the pike move to the edges to await the migrating shoals of prey fish. The deeper we get into summer, the more we can witness this phenomenon. For this reason, larger pike probably migrate further than smaller pike. We can find them in the open water at night since they are no longer exposed to the risk of cannibalism.

At night, pike move the furthest from the shores. Especially the larger pike seem to follow their prey all the way into the open water at night. Depending on the latitude, the nights in Europe can get pretty dark.

Pike can see well in the dark. Like the zander, the pike also has a light-reflecting layer called “tapetum lucidum” in its eyes. That layer does not reflect light as well as for the zander, however, allows the pike to see pretty well in darkness. Dusk, full moon, clear water, and a cloudless sky allow the pike to hunt well at night.

The visibility in open water is often greater than near the shore, where waves and plants cloud the water. For this reason, it may be worth staying on the water for an

hour or two longer. But more to the open water than near the shore.

6.7.13 Shallow areas in the open water

A stagnant water body is not evenly divided into shallow banks and deep open water. The shores can be narrow or wide, deep or shallow. The open water can also have different structures. Humps, for example, create interesting structures in the open water. These humps may only be small elevations, but can also span large areas.

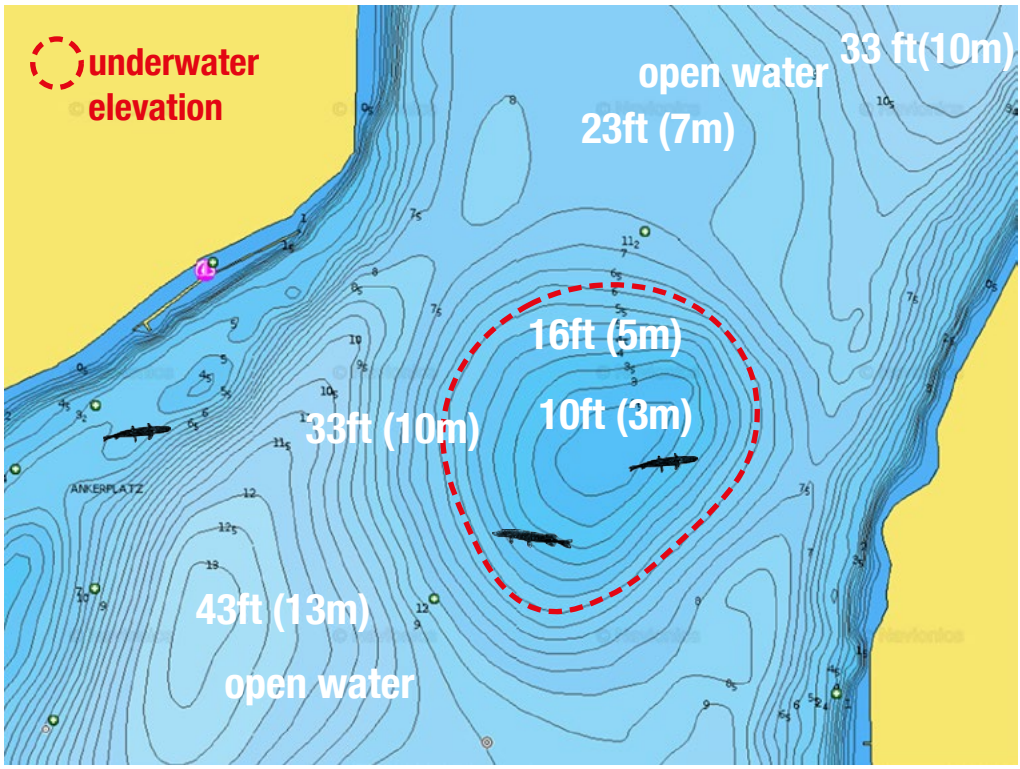

Figure 6.49—Humps in open water

If there are shallow areas in the open water, the illuminated vegetation can act as a magnet for the fish. Smaller prey and predatory fish can find sufficient protection and food there. The conditions are similar to those on the shore. Large predatory fish, which stay deeper during the day, surface to these humps at night to hunt for prey. Especially in summer, larger pike establish their territories on these overgrown humps. Here, not only do they find similar conditions to those on the shore but are also protected from anglers during the day. Many anglers hunt pike from the shore. Consequently, many fish relocate to the open water, establishing their territories on these plateaus.

6.7.14 The depths of the open water

In large lakes, some pike move their habitat to the open water. In order to catch those pike, we need to offer our baits at the right depths.

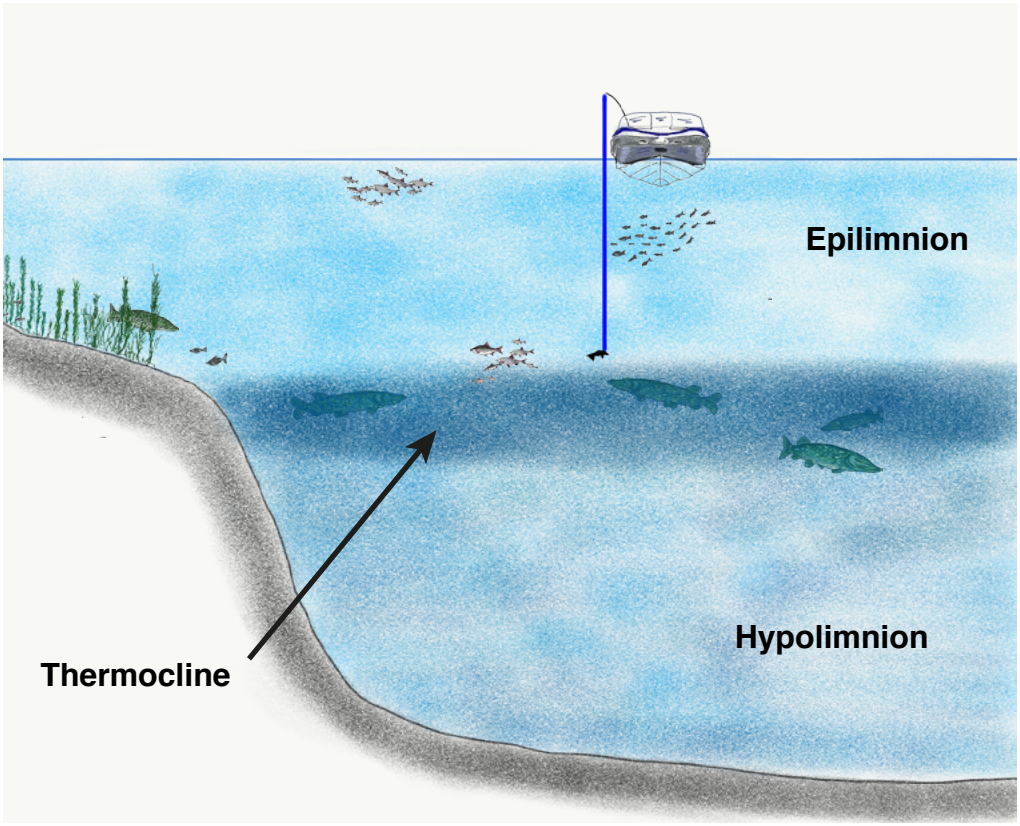

Figure 6.50—Open water pike and the thermocline

Remember, only the large pike dare to move to the open water permanently. These big lads enjoy cooler waters and stay deeper in the water column. In these darker conditions, they are also harder to spot for prey fish. The darkness serves as a substitute to the shore vegetation in terms of camouflage. The setup is quite convenient for the larger pike as most prey fish only find food in the depths. Most fish feed on zooplankton in open water. These microorganisms stay in deep water during the day and only move towards the surface at night. During the day, larger pike inhabit the same depths as their prey—at least in summer.

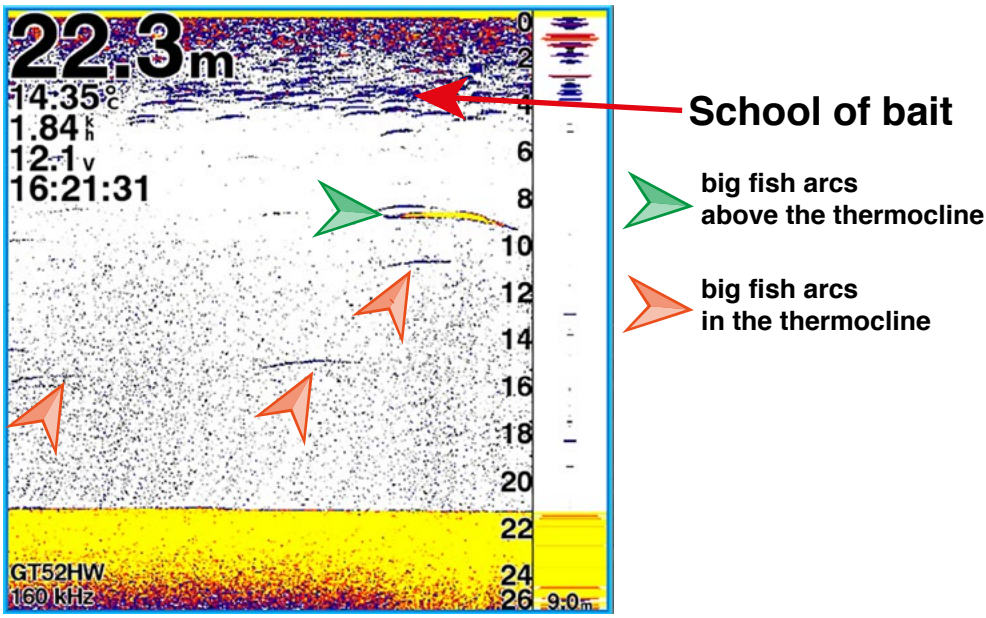

Figure 6.51—Pike in the thermocline

In the open water, the pike stay mostly above the thermocline. In the thermocline, conditions are usually turbid, with visibility restricted to only a few inches / centimeters. As the water density changes abruptly at the thermocline, it acts like a barrier in which suspended particles and plankton collect.

For prey fish that stay above the thermocline and eat the plankton, the pike that temporarily visit the thermocline are not visible. Despite their size, they are perfectly camouflaged and can emerge from the thermocline to grab their prey. The prey at this depth are usually larger than at the shore, so we should use larger baits if we are fishing the open water.

At night, when the plankton moves towards the surface, huge schools of bait await them. They arrive from the shore or from deeper regions of the open water. With clear skies and sufficient moonlight, the pike have great hunting conditions. Some pike follow their prey towards the open water. The larger pike which stay near the thermocline all day, tend to remain there. Pike are cold-blooded animals and need some time to adapt to changing conditions. Also, pike do not have to feed as much in lower water temperatures—their metabolism slows down. The energy requirements of pike at colder water temperatures are lower, similar to as in winter (see chapter 3.3.4 „How much time passes between meals?“ on page 32). That means that at the low temperatures near the thermocline, the pike only have to feed every few days. Also, remember chapter 3.3.1 „Hunger and feeding“ on page 29. According to various studies, only females feed to gain weight while males reduce their intake and actually lose weight. In summary, pike are difficult to catch in the open water.

It is hard for pike to hunt actively after experiencing a rapid change in temperature, such as of 41°F (5°C) or more. Commercial fish farms know of this problem, having to

adjust the temperature slowly during transport.

That does not mean that pike cannot withstand strong temperature changes for a short time. They can handle rapid changes, however, if they have the choice, prefer not to stress their bodies. It would be rather unusual for a pike to dive down to 42°F (6°C) of cold water, only to surface back to 68°F (20°C) of warm water a short while later.

An important note: Even if large pike prefer to stay in the open water, that does not mean we should abandon the shore. Various studies have shown that the vast majority of pike, regardless of their size, will never move more than 650-1,300 feet (200-400 meters) from the shore.

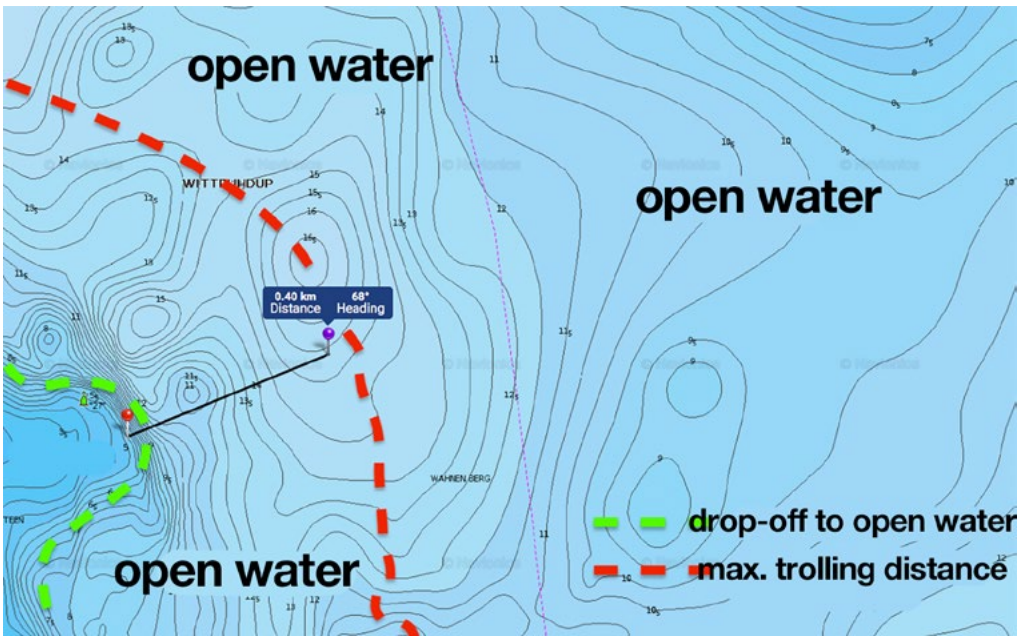

Figure 6.52—Optimal area for trolling

So if you like to go trolling, it makes little sense to move back and forth through the deep water. It is more effective to orient yourself on the shore than to chase the one or two pike that may stay further out. Of course, it always depends on the conditions and the specific water body. Just know, large underwater plateaus in the open water attract fish just as much as the shore—at least at night.

Remember

In summer, pike in the open water often stay in or near the thermocline. It is cold there and they have to feed much less than their conspecifics near the shore. Large females need one or two larger fish every few days to gain weight. Males often reduce feeding to a minimum and even start to lose weight by late summer.

And to be honest, large pike are not as common as medium-sized pike. So the odds of catching a large one are quite slim. Place, time, depth, and bait all must be right plus the pike must be in feeding mode. So pike fishing in open water is not easy in midsummer, even though we might know where they stay. That is all the more reason for us to be proud when we catch one of the big ones in stratified water. To succeed, you will need a good bit of luck, plenty of knowledge, and above all the ability to operate your fish finder.

6.8 Midsummer

Water temperature: > 72°F (22°C)

The midsummer is more or less short depending on the region. It marks the highest temperatures of the year. In Germany, we usually do not reach peak temperatures until August. In general, not too much changes during midsummer and pike still inhabit the same territories as before. Nevertheless, we have to account for some slight environmental changes.

6.8.1 Prey fish

In midsummer, prey availability changes in many waters. In waters with a rich whitefish population, for example, prey fish tend to change location. Leading up to the summer, many roaches spend most of the day near the shore. In the midsummer, these fish move more towards the open water while most pike remain in their territory. The pike must adapt to the circumstances and adapt their prey preference accordingly.

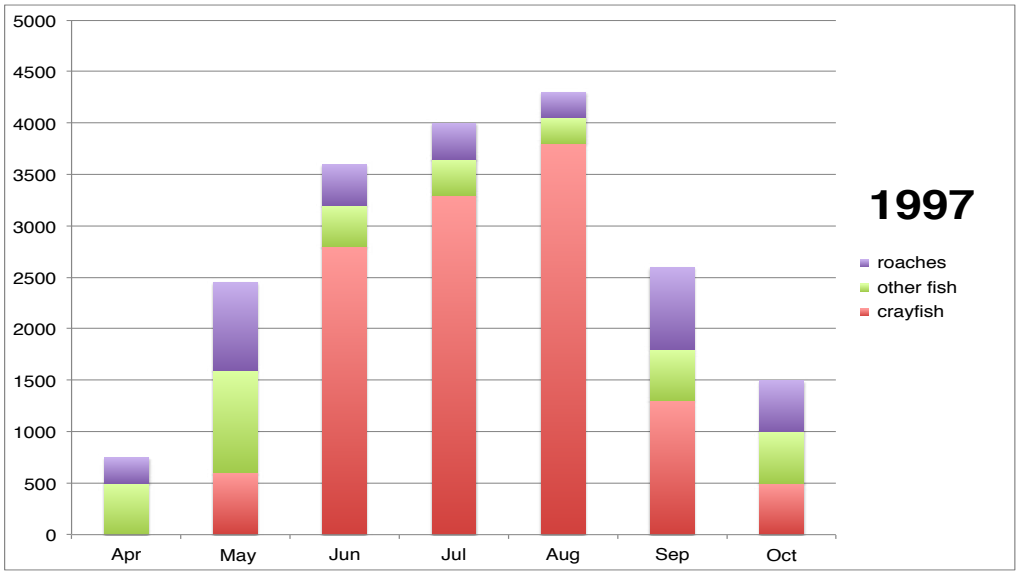

Figure 6.53—Preyfish 1997

In the Großer Vätersee, researchers analyzed the pike's prey over a period of two years. While in 1997 crayfish were the main food source and perch were not on the menu at all, that changed considerably by 1998. Going into August, the crayfish played only a subordinate role, and the perch appeared as an essential food source by May.

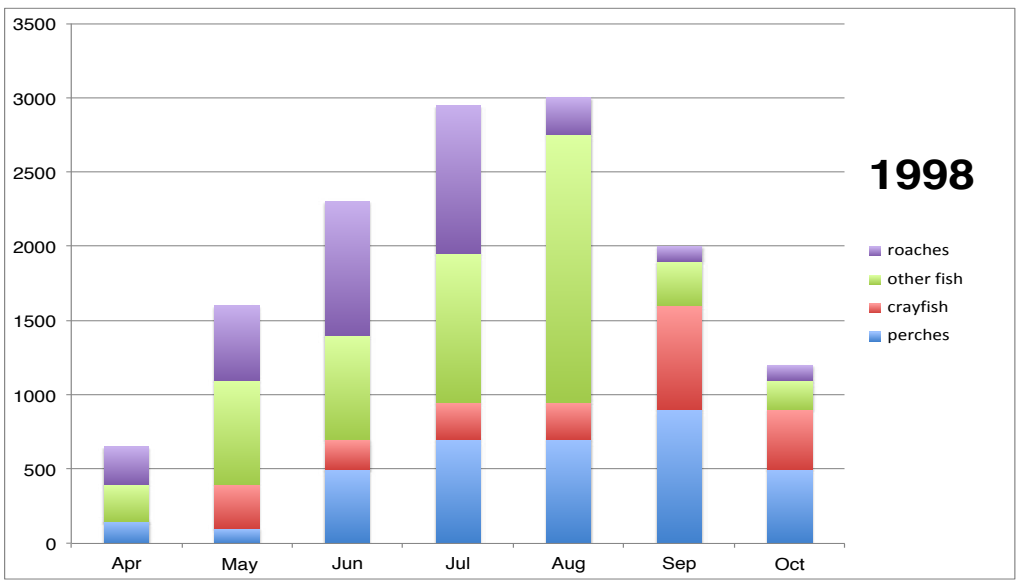

Figure 6.54—Preyfish 1998

What caused this change?

In this specific case, it was due to the introduction of the zander as an additional

predatory fish. While the perch dominated the open water in 1997, the zander chased them away by 1998. In order not fall prey to the zander, the perch moved to the protective shore area. Here, they were safe from the zander, but the pike suddenly found themselves in a land of milk and honey—perch are much more nutritious than crayfish.

With the perches moving less frequently to the open water, the pike fed more and more perch into August. Only once the perches were too big for the zander, did they relocate once more.

Remember

Prey fish are not in constant supply. Pike must regularly adapt their feeding behaviors. Knowing this should help us to select the right bait. Pike might strike at many different baits, but if you present the most suitable bait for the given context, you can improve your odds significantly.

6.8.2 The temperature and the oxygen

The high outside temperatures cause problems for many fish, including the pike. Small, medium-sized, and large pike all master the hottest temperatures of the year in different ways. Usually, the larger pike have a harder time dealing with high water temperatures than the smaller pike.

As water temperatures continue to rise, the strongly changing oxygen conditions have a great influence on the fish and thus also on the pike during the course of a day.

As already mentioned in chapter 4.4 „Oxygen“ on page 76, partial oxygen deficiency may occur in some water bodies and water sections. That is all the more likely in cloudier or nutrient-rich waters. Fish usually cope well with these tense circumstances, but the adjustments have an impact on their behavior. We have to adapt accordingly.

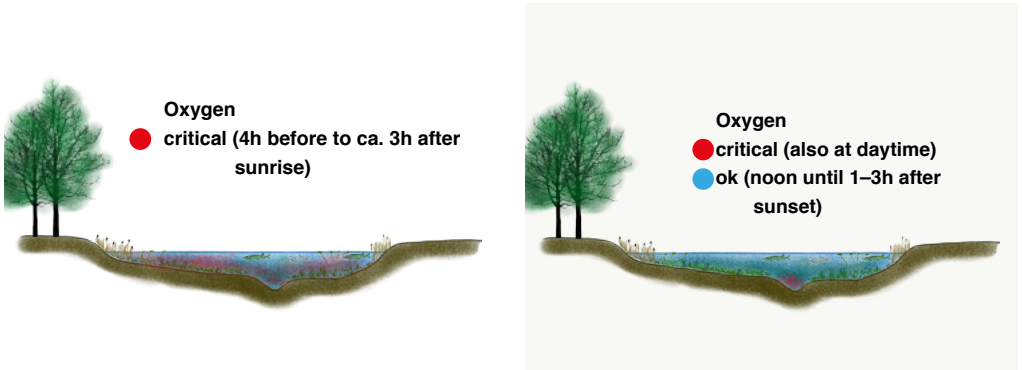

Figure 6.55—Critical and acceptable oxygen concentration in nutrient-rich waters

If the oxygen concentration is low, it often bottoms out shortly before sunrise. After that, it returns to normal until around noon. At noon, many fish start to feed. Feeding peaks in the late afternoon. So if we are fishing the shallow and warm shore areas, we

should head out rather in the afternoon or evening.

Starting at sunset, the available oxygen in the shallow, overgrown shore area is quickly consumed. The oxygen concentration usually bottoms out just before the early morning hours. The fish react to the oxygen deficiency and move towards the open water in the evening. There they can feed on the rising zooplankton at night. In the morning they return to the shore.

The heat is another problem for the large pike. The sun causes the water temperature in many areas to rise so strongly that many pike, especially the larger ones, seek cooler water. These cool areas are in different spots, for example, in the open water, which is becoming increasingly important for large pike.

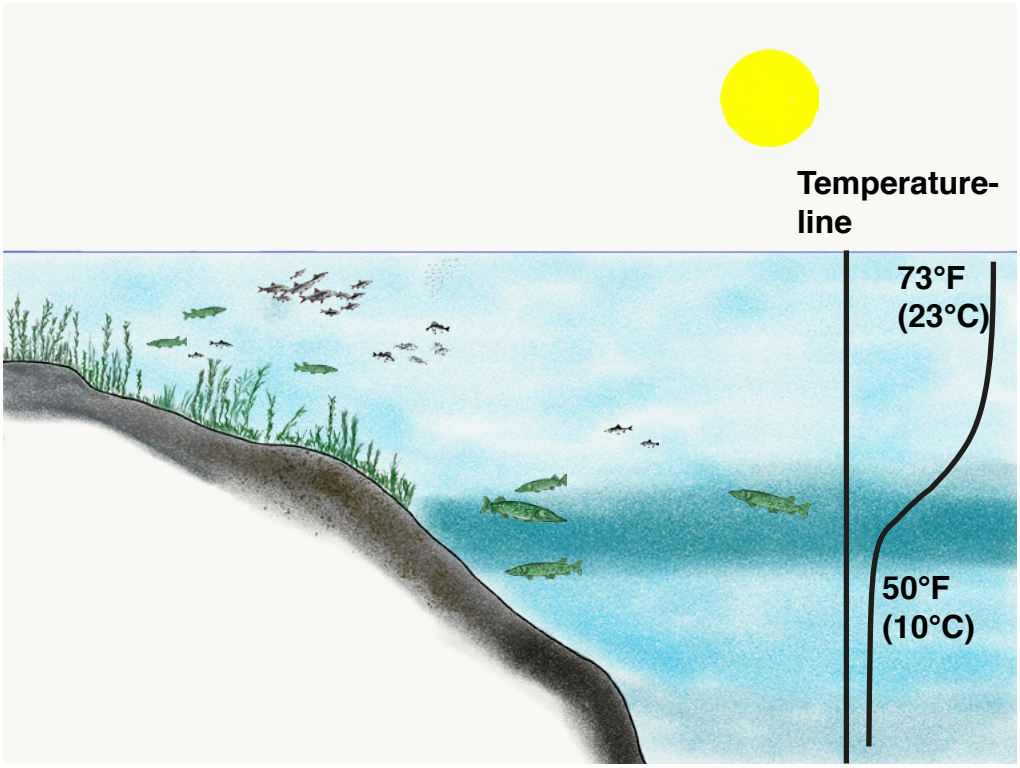

Figure 6.56—Water temperature and thermocline (mesotrophic waters)

In these conditions, pike choose to dive to cooler layers in the water column if possible. In deep mesotrophic waters, pike will likely stay near or in the thermocline.

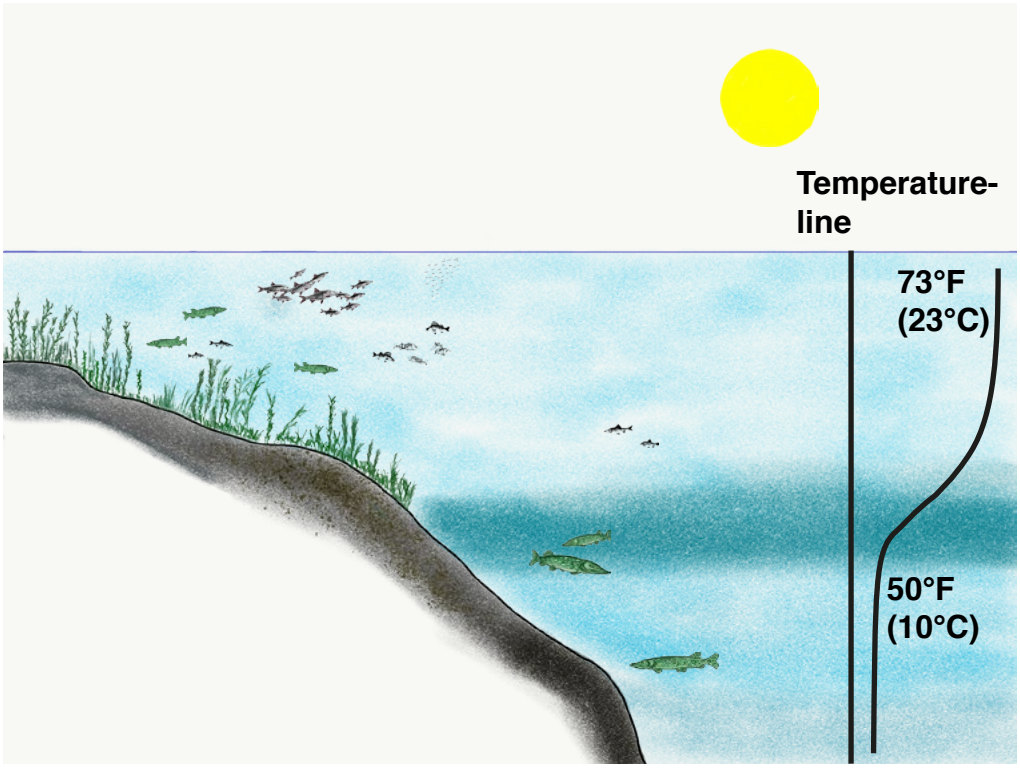

Figure 6.57—Water temperature and thermocline (oligotrophic waters)

In oligotrophic waters, prey fish and pike may also stay below this layer.

The pike which stay close to the shore look for other alternatives. The edges towards the open water are attractive spots. These pike now stay deeper than at the beginning of summer. In many shallow eutrophic and also some mesotrophic waters, the low oxygen content prevents pike from diving deep for a longer period of time. They must remain in shallow water for most of the time. In these conditions, cooler zones are especially important.

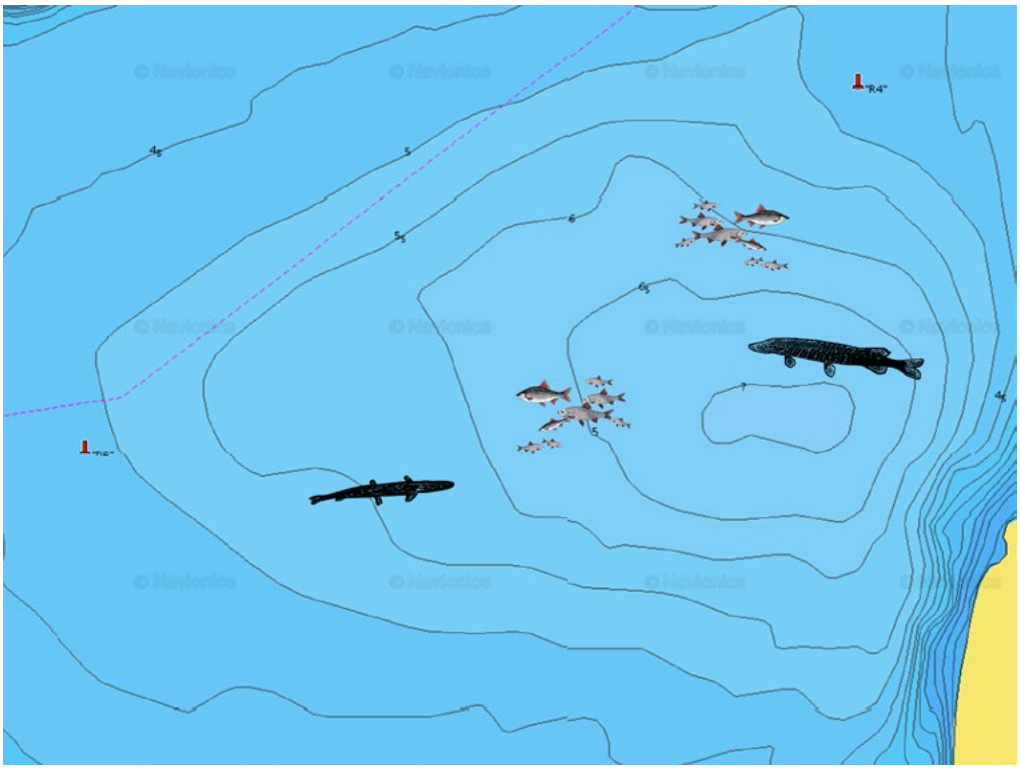

Figure 6.58—Holes sometimes have cooler water

If we take the many shallow waters in the Netherlands as an example, the hotspots for pike fishing decline sharply in numbers during midsummer—the pike usually concentrate in a few spots. During the hottest temperatures at noon, anglers can find less pike in the shallow and warm areas. The pike will stay in shady places or cool holes instead. It is not until late in the evening that the pike start to be more active again.

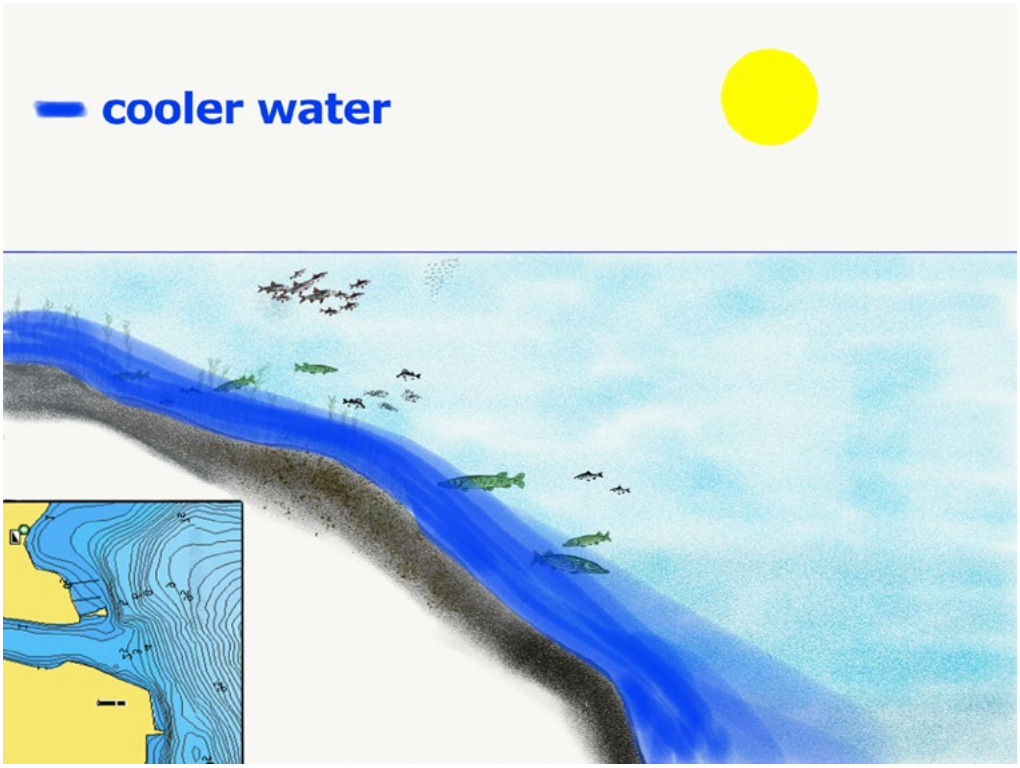

Figure 6.59—Inflows carry cooler water with them

Tributaries usually carry cooler water as well. Larger pike love these spots to cool down. They often stay slightly below the edges bordering the tributary. The cooler water has a higher density than the warm surface water so that it sinks into the depth.

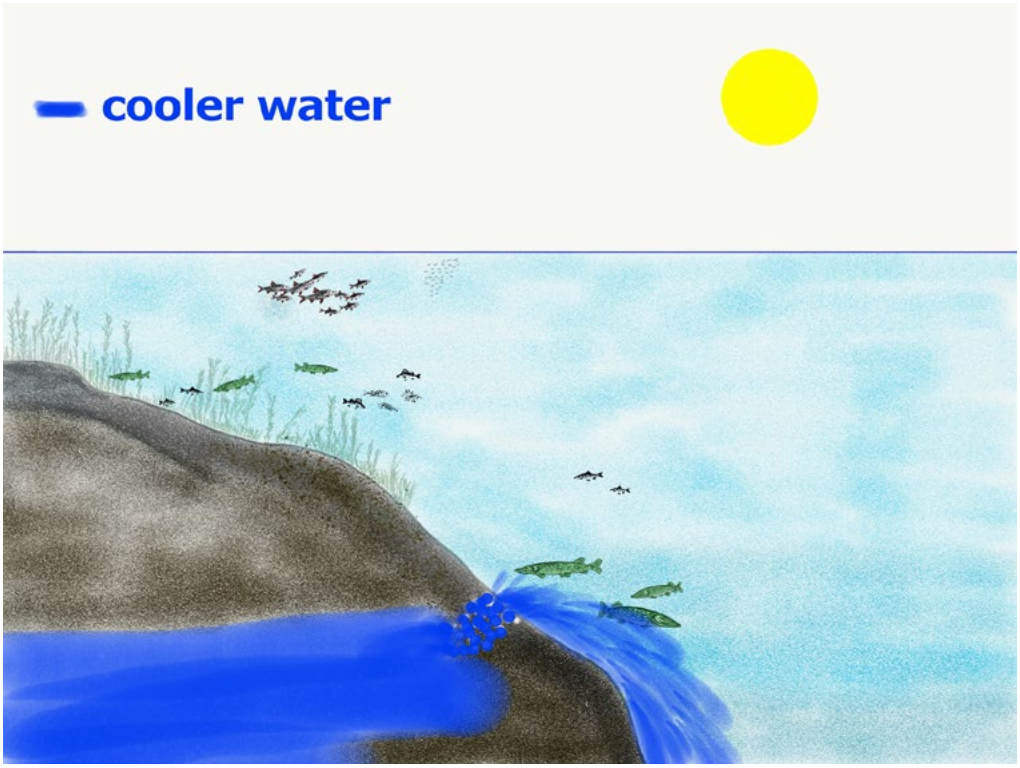

Figure 6.60—Lakes with groundwater inflows have areas with cool water

Many water bodies also feed on groundwater—it is often the case if there are no external inflows. Groundwater rises deep from the rock and is always cool. It does not enter the water evenly, but the inflows are scattered. Those who know the locations of these inflows have the jackpot for the summer. Pike that seek cooler water actively search for these inflows.

How can we find these spots?

Figure 6.61—Depth thermometer Anaconda GTM

We can try our luck with a depth thermometer again. Of course, that is a huge task if the water is larger. However, in smaller water bodies this option might be suitable. Plus, you have the added advantage of being able to cast the thermometer from the shore. Whoever finds these inflows holds a big advantage over other anglers. So keep these hotspots to yourself.

Another option is to look for these inflows during winter when ice forms on the water: The inflowing groundwater is now often much warmer than the 39°F (4°C) cold water at the bottom of the water body. If the water body is shallow, it flows upwards and prevents or reduces ice formation. A glance at the ice cover quickly reveals where open water or a thin layer of ice are. We should remember these spots for the coming midsummer.

Figure 6.62—Power plants and industrial impacts

Since the water around industrial plants is often quite warm, most pike avoid these areas, at least for a longer stay. Especially near or downstream of power plants, the water temperature is higher all year round. In summer, the water temperature of these spots is often above 77°F (25°C), which is a unfavorable range for pike. On the other hand, these water temperatures attract many whitefish.

Accordingly, some pike will go hunting in these water stretches, while others, usually larger pike, will avoid them. As a general rule, the zander is more abundant than the pike in these areas (see „Finding Fish. The Smart Way - The Zander“, Chapter 6.2.1).

Figure 6.63—SShady spots attract fish and predators

Shady places are attractive for pike of all sizes. The larger the area, the better. The shallower the water, the more attractive the shade. A wooded shore on a sunny afternoon can provide a good fishing day.

The first really hot days can quickly heat up a water body. After a few days of this sharp rise in temperature, many fish reduce their food intake to adapt. Of course, we have to differentiate according to the size of the water, because small, shallow waters or shallow, secluded bays heat up faster than large and deep areas. During the first days of a hot period, it is better to concentrate on larger and deeper spots. Here, we are more likely to catch a large pike than in the shallow sections.

If the temperatures drop for a few days, the opposite is the case. The once warm bays and water sections cool down fast. That gets the fish biting. As temperatures decline after a few hot days, we should fish shallower spots.

Remember

No matter if in eu-, meso- or oligotrophic waters, in the hot season cool sections attract larger pike magically. It does matter whether the water is stagnant or flowing. Pike will gravitate towards these spots regardless.

Those who find these cool spots can catch plenty of pike year after year. In general, the water around river inlets and groundwater inflows is colder than in other sections in midsummer.

6.9 Late Summer

Water temperature: 59-68°F (15-20°C)

Late summer brings about change once more. The weather becomes more unstable. We have many warm days, but cool nights. The water becomes noticeably cooler in the course of late summer, increasing pike activity. In many cases, the late summer conditions continue into early autumn. So, there is no clearly defined transition. It is more of a process that cools the water down to 50-55°F (10-13°C).

The vegetation is now slowly receding, and dead plants are covering the bottom. In typical waters with many whitefish, only a few shoals still move between the shore and

the open water. Most have already relocated to the open water. At this time of the year, most fish are a lot more active.

While many pike still hunt in their summer territory, some have already relocated. Almost all pike that remain on the shore are forced to change their prey preference. In summer, fish made up the majority of the pike‘s diet. Now, they have to increasingly look for alternatives. As in spring, the diet of the pike differs considerably between water bodies. There is no general best bait that we can recommend. However, more experiments may be carried out.

Remember

Of course, across water bodies, these changes start at different times and vary in their duration as well. Large water bodies differ from small ones and deep water bodies from shallow ones.

Pike react quite differently to all these changes. Some feed very little while others undertake extensive expeditions in the cool water. The late summer creates quite unique conditions which make it difficult for us anglers. As in spring, we have to adapt our bait presentation, hotspot selection and time on the water to the given conditions.

6.9.1 Feeding

It is a fact that the pike‘s diet changes at this time of the year. At the end of late summer, about 3/4 of the year‘s newly born fish will have fallen victim to predators, so that less and less prey is available. The behavior of the remaining prey fish also changes as they slowly adjust to the cooler temperatures.

For example, the pike might hunt more perch instead of roaches. Bigger roaches now slowly move to the open water, while most perch remain on the shore. But also frogs, rodents and invertebrates can supplement the pike‘s diet.

As temperatures drop, pike gradually become more active. Remember chapter 3.3.4 „How much time passes between meals?“ on page 32. Autumn months are marked by intense feeding. That period is slowly starting now, which makes for great pike catches in late summer and early autumn.

6.9.2 Baits

The prey of the pike is bigger now. Our baits should be too. Since pike and prey are more agile now, we can move our baits faster. Anything that jerks and twitches works wonders. Crankbaits, jerkbaits, spinners, and Co. offer a lot of advantages now.

6.9.3 Hotspots

The vegetation is slowly receding, offering the predators more space to hunt. Larger pike are now increasingly looking for underwater vegetation in the shore area. Bran-

ches, trees, and shadows play a lesser role now so that constructs such as bridges no longer magically attract predators.

While most pike remain motionless in the water during the long summer days, they are a lot more alert in their territories now. The pike move more frequently, enlarging their territories if possible. Pike cross paths more frequently which can result in cannibalism and food competition—the pike fight more and more over the remaining prey.

Those who plan their fishing trips accordingly in these conditions can achieve a big advantage on the water.

6.9.4 Edges

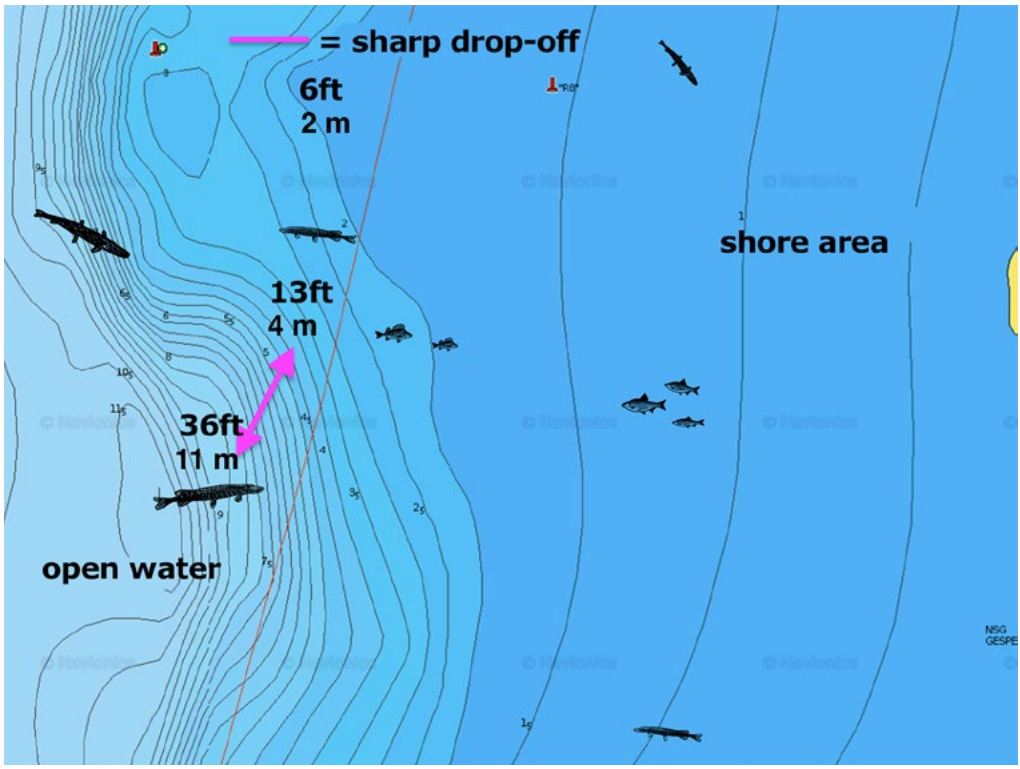

Figure 6.64—Pike at sharp drop-offs

Larger prey fish move regularly between the plant thicket and the open water. Large pike love free water, but they do not wish to miss out on these migrating prey fish near the shore. With increasingly cooler water-temperatures, the larger pike will ascend more often from the depth. They wait in the morning and at dusk at the deep drop-offs near the overgrown shores.

When the large pike move towards the edges in large numbers, the small and medium-sized pike relocate. They move closer to the shore and stay in close proximity to each other. That is another reason why pike near the shore cross paths more often during this time. They do not stay deep. In contrast to the summer, we often find them

in 3-10ft (1-3m) deep water.

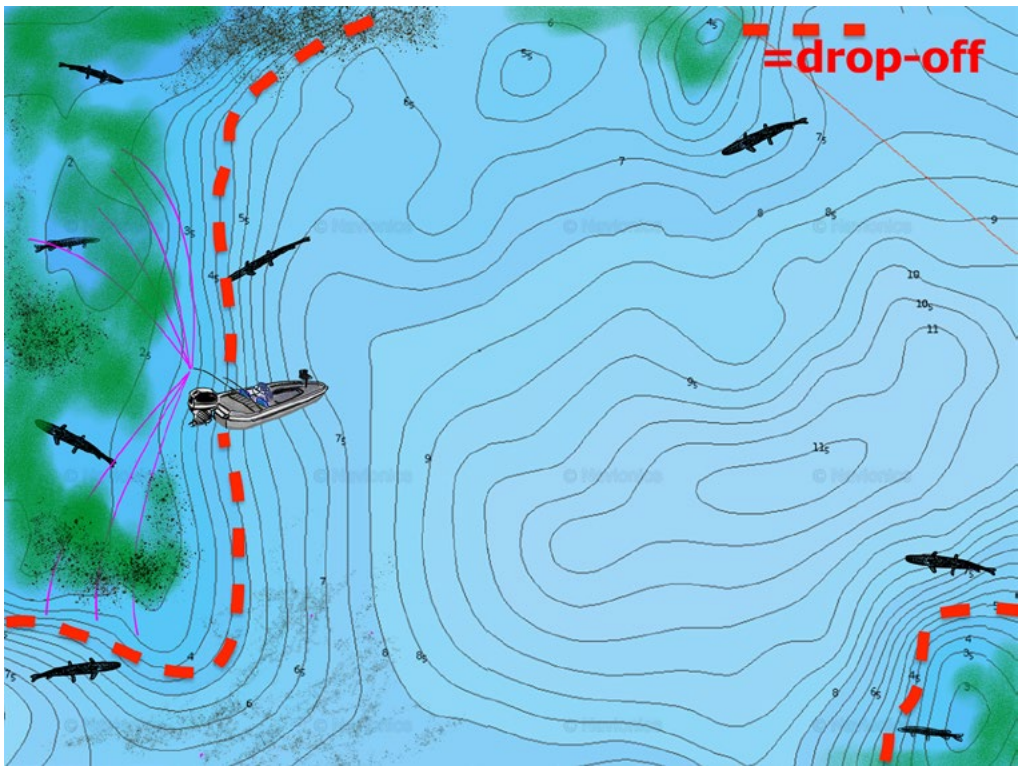

Figure 6.65—Different shore areas hold different numbers of pike

JLarge and diverse shore areas attract prey fish and consequently pike. Those who now orientate themselves on the edges can fish the shores during the day and the edges at dusk. Since most pike hunt actively now, we can have wider gaps between casts and cover a bigger area. Nevertheless, endurance is your best friend. Although pike are more active now, that does not guarantee success.

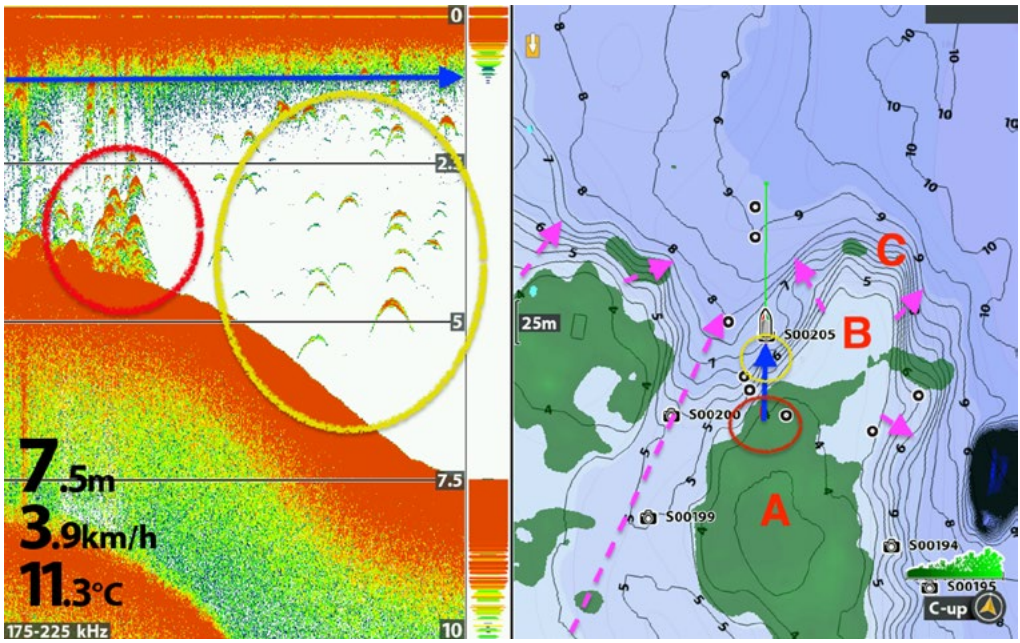

Figure 6.66—Gradual and sharp drop-offs

Legend of Figure 6.66:

- blue arrow (left side) - recording of distance covered
- blue arrow (right side) - the direction the boat travels
- short pink arrow - deep drop-off
- long pink arrow - gradual drop-off
- red circle - end of vegetation
- yellow circle - fish crescents above the drop-off
- A - Vegetation
- B - no vegetation, although the edge has not fallen off yet
- C - no vegetation (gradual drop-off)

In many shallow waters, there are no deep drop-offs that we can orient ourselves by. In these conditions, we need to study the underwater vegetation intensely. The areas where the vegetation slowly becomes sparser will attract larger pike. From here they can hunt towards the vegetation.

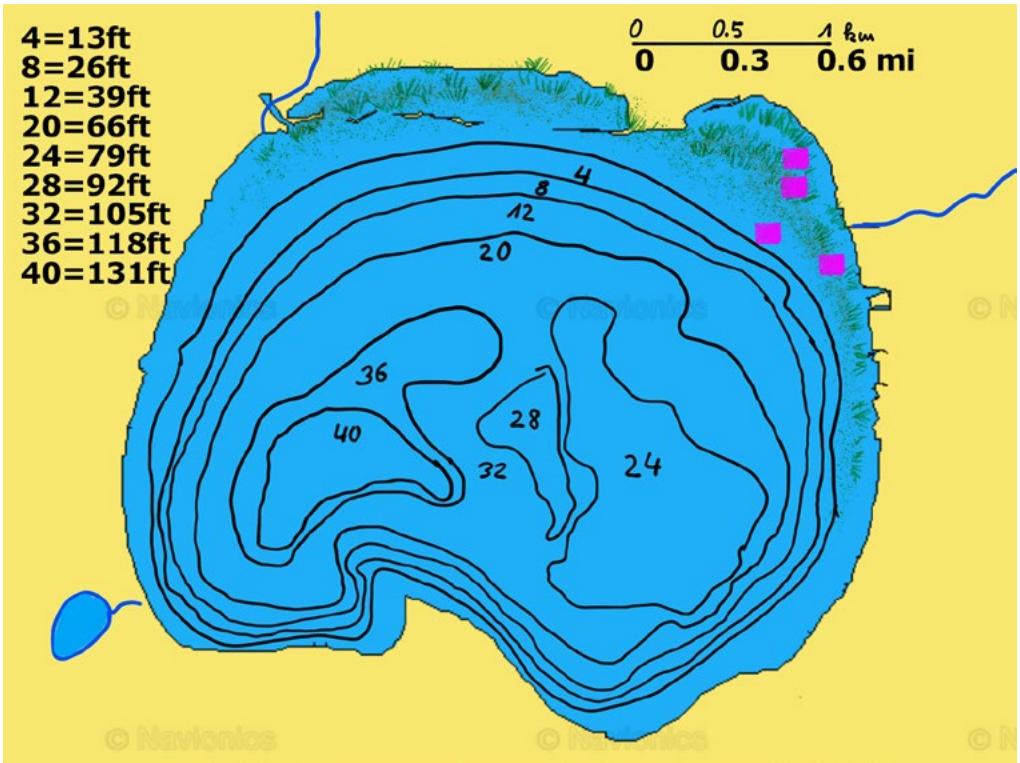

Figure 6.67—Deep oligotrophic lake with only two shallow areas

Deep waters with a few bays offer excellent conditions to catch larger pike in late summer. While lurking pike also stay on the shore during the summer months, the large ones that prefer the open water like to stay at these bays from late summer onwards. Pike concentrate in large numbers in these bays. That is great for us because these hotspots are easy to locate. We can find similar conditions in large, deep dams with sharp drop-offs. So in late summer, we know pretty well where to find pike.

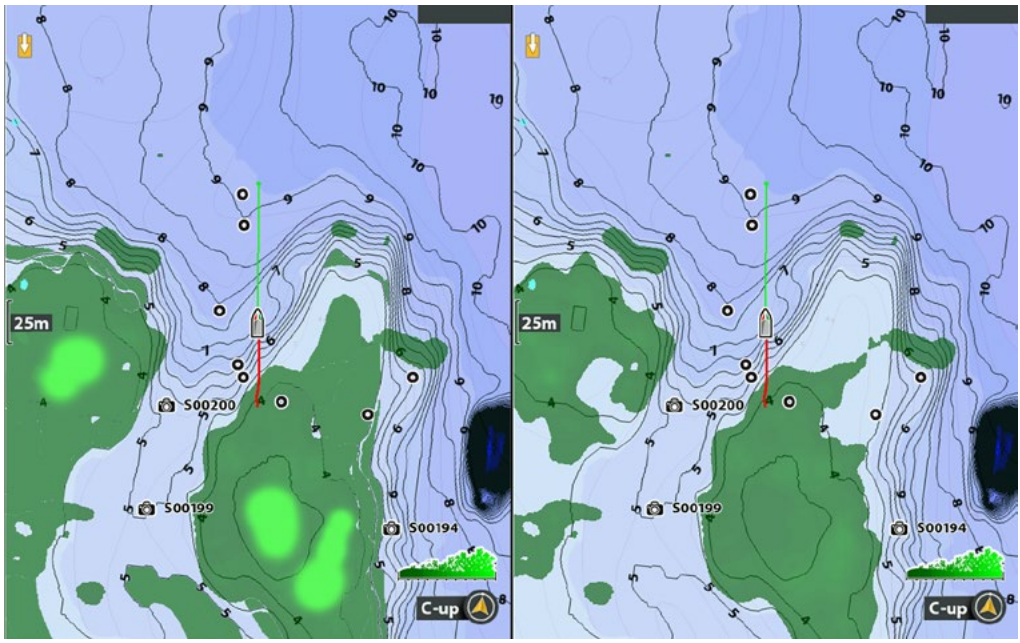

Figure 6.68—Strong vegetation in summer - medium vegetation in late summer

Do you remember that in the early summer we searched for vegetation with mobile and fixed fish finders? Across all waters, knowledge about the exact distribution of the underwater vegetation will bring some additional success. Vegetation that was too thick and impenetrable for larger pike in the summer now offers the optimal hunting conditions. If the vegetation is scarcely dispersed, pike live in close proximity to one another. Prey fish actively seek cover and shelter in the remaining vegetation. These attract the pike which in turn attract us. Everything meets in a confined space. Perfect!

6.9.5 Wind

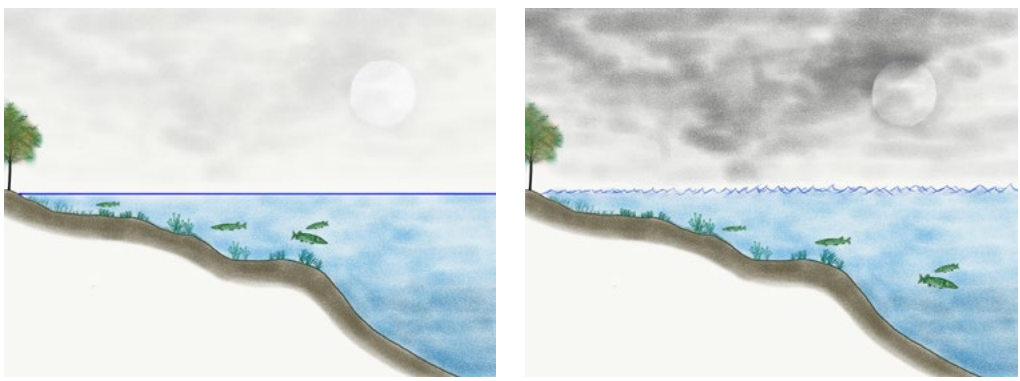

Figure 6.69—Comparing the position of pike with and without wind

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Wind becomes more and more probable in late summer and it directly influences our fishing. Waves that that might have aided us in summer can now have the opposite effect. Towards autumn the winds are more powerful and cause havoc on the shores. If the wind blows strongly, strong waves push the smaller and medium-sized pike to the edge of their territories. The larger pike also react, moving further towards the open water and often staying somewhat lower than usual.

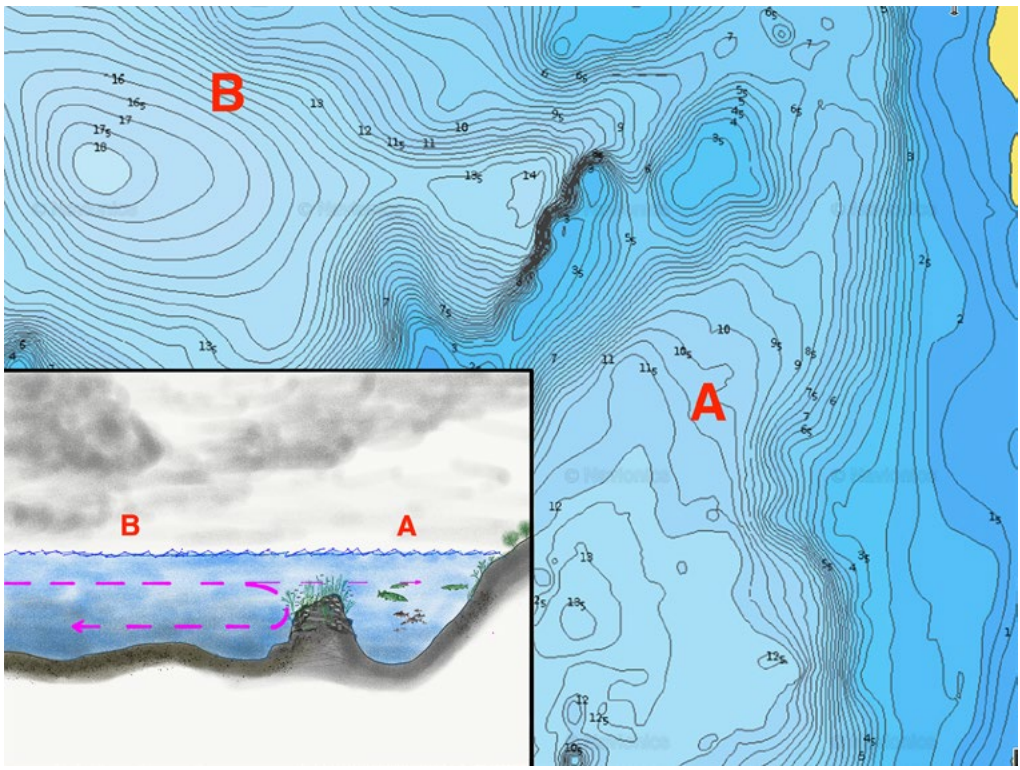


Figure 6.70—Strong currents - Changes in locations

It is also common for prey fish and pike to migrate to areas protected from waves and currents. Especially when the wind lasts a few days. These areas can be quite diverse with structures such as humps, headlands, branches, and more. The underwater vegetation also helps to slow down the currents. Pike often move close to the vegetation during strong currents. In stagnant waters, the wind generates currents similar in strength to those in flowing waters.

Figure 6.71—Bait presentation in the flow direction

In a current, pike direct their body in the direction of the current. That allows the pike to expend less energy, both during resting and hunting. We should always be aware of this when we cast our baits to present them to the pike. In Figure 6.71, the direction of the current is constant across the entire water column.

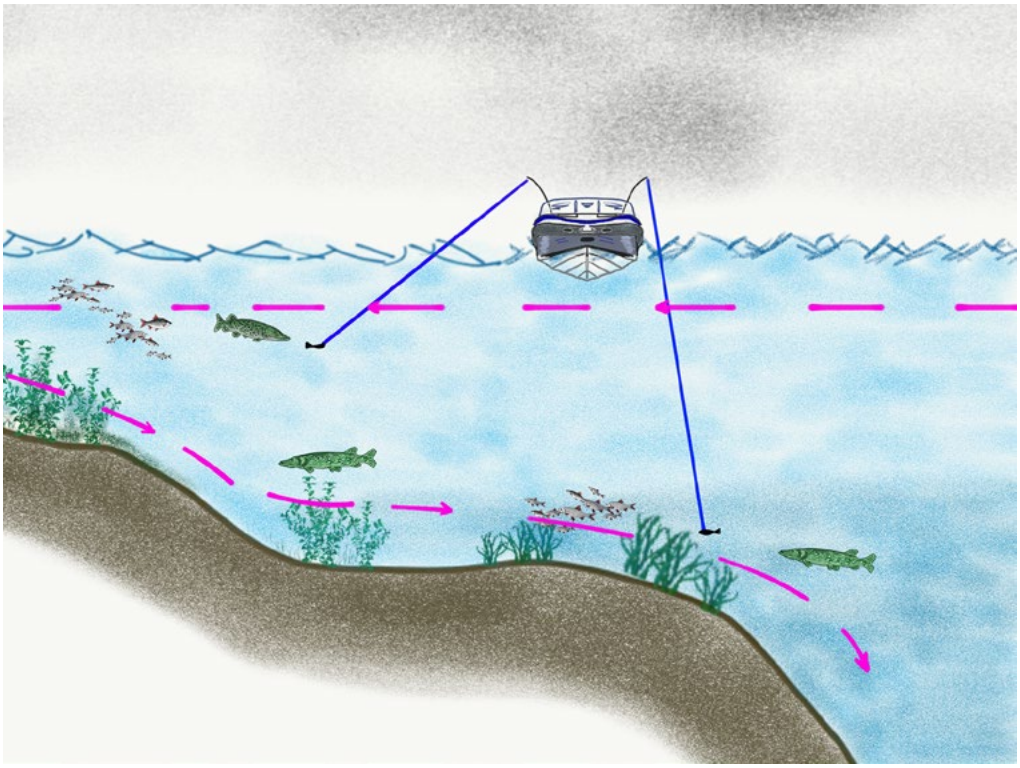


Figure 6.72—Bait presentation in the lake in the direction of the current

In stagnant waters the direction of the current can vary between depths. Depending on the depth of the water, we should cast our baits in the direction of the current, which does not necessarily mean with the wind. We refer back to chapter 4.6 „Wind“ on page 91—the direction of the current changes according to the depth of the water.

Rememeber

In late summer, many pike return to the shallow water. They slowly but surely start to feed aggressively. We know that from now till the end of autumn, they will eat almost four times as much as in most other calendar periods. To illustrate this, we recall chapter 3.3.3 „How many fish does the pike feed?“ on page 31. Five fish as an average meal implies that each pike has to lunch 25-30 attacks for each meal—these are only averages and some pike will require more attacks while others less. In concrete terms, that means that as long as we know where to find them, we should hook plenty of pike during this time of the year.

6.10 Autumn turnaround - everything will be different

Water temperature: 50-59°F (10-15°C)

The turnaround in autumn is a short period. It is also not equally pronounced in all waters. In principle, the reversal is characterized by rapid cooling of the water and the mixing of the individual water layers. During this reversal, the feeding activity of many fish declines noticeably. Only once conditions stabilize will the behaviors of the underwater inhabitants normalize.

In shallow, unstratified waters, the reversal progresses rapidly. Due to cold weather, rain, coupled with strong winds that swirl the water strongly, the temperature of the water column adjusts itself in a relatively short time.

In stratified standing waters, which are usually deeper than 15ft (5m), the autumn turn lasts a little longer and has also stronger effects on the life under water. In these waters, the duration of the autumn turn depends on the dissolution of the different thermal layers.

From spring to late summer, a stable thermal stratification in stratified eutrophic and mesotrophic waters restricts the habitat of the fish stock. Most fish stay in the epilimnion during this time. The thermocline, which separates the epilimnion from the hypolimnion, acts as a natural barrier that most fish rarely penetrate. In the course of the warm months, different habitats forms in the individual layers. The hypolimnion, in particular, is increasingly becoming a hostile habitat for fish, as the oxygen concentration drops sharply and some toxic substances form.

6.10.1 Cooler temperatures

We described the formation of the stratification in detail in chapter 4.3 „The stratification of a standing water body“ on page 69. In autumn the water in the epilimnion cools down, and its temperature approaches that of the hypolimnion. Stimulated by the strong autumn winds, the cool water mixes again. The oxygen-poor and sometimes toxic water of the lower layer now enters the entire water column. That changes the oxygen concentration in the water as a whole. The oxygen concentration of the upper layers goes down a bit while the water of the lower layers gets enriched with oxygen for the first time in months. The natural barrier has disappeared, and the fish are now free to roam towards the depths of the water body. Many fish will react to these changes.

6.10.2 Effects on fish

An abrupt drop in temperature leads to an abrupt drop in the activity of most fish. Prey fish and pike need time to adapt to the new situation. Only once the oxygen concentration and the temperature normalize do the fish return to their normal activity and feeding patterns. Until then, they greatly reduce their food intake.

The fish can now access section of their respective water body that were inaccessible before. Many fish are changing their whereabouts and are sometimes looking for new spots to feed. These may be humps that previously were not accessible below the

thermocline, or the bottom itself. The pike react to these changes, too. As the prey moves, some pike follow while others stay near the shore and change their prey preference. Until the behavior underwater has normalized, it will be difficult for us anglers to catch pike.

6.10.3 Duration

On the one hand, we differentiate according to the duration of the turnaround and on the other hand according to how long it takes for the fish stock to adapt. The timing of the autumn turn depends greatly on the weather and the water. While the temperature in small, unstratified shallow lakes cools down and adjusts quickly, it takes longer for the water column in stratified waters to cool down.

When the outside temperatures drop to 50-55°F (10-13°C) for a few straight days, the water cools down to a temperature at which the density of the water allows for the layers to mix. Winds and waves also play a factor for the water column to mix. Once we have these conditions, we can expect the autumn turn to take effect. For us, this knowledge is crucial as many fish stop feeding entirely for the duration of the turnaround. Thank God that the autumn turn occurs at different times depending on the water.

The water in small, shallow water bodies circulates quickly. The shallow depth and the quantity of water are the reason for this. The drop in temperature can be quite pronounced for a short period of time, which may cause the pike and other fish to stop biting for a short time. However, frequently, the situation normalizes within a week.

The turnarounds in larger, shallow waters follow later. The conditions for us anglers are better in these waters, as the temperatures tend to drop at a gradual pace—it takes longer for the surface water to cool down. The fish can adapt to the new climate slowly. They might reduce their food intake but likely will not stop feeding altogether.

Small, deep, stratified waters follow in third place. The surface water cools down just as quickly as in shallow, small lakes, but the mixing of the water layers takes much longer due to the depth.

In large, stratified waters, the turnaround kicks off last. It takes a long time for a lot of water to cool down. Depending on the weather conditions, we can assume a period of more than 1-2 weeks for the water to mix. The effects on the fish are stronger in the stratified waters, so they need a lot longer to adapt to the new situation.

In general, bodies of water with turbid or brown water cool down faster and earlier than similar bodies of water with clear water. The entire turnaround lasts only a few days to 2-3 weeks. Depending on the water, we might have to accept that the fish will not be biting for some time.

Remember

Between late summer and the cold season, fish will have to adapt to new underwater conditions. Among other things, the temperature, the oxygen concentration, the visibility, and the color of the water will change. In smaller lakes, the turnaround starts first, followed by larger and deeper water bodies. Rain, winds, and storms accelerate these processes considerably. From that we can draw some good guidelines for when and where to fish for pike at this time of the year:

- After a few consecutive days with temperatures between 50-55°F (10-13°C) and strong winds, we are ore more likely to catch a pike in larger or deeper lakes. In smaller shallower lakes (< 15ft (5m) depth) the turnaround may have already started.
- If this weather lasts for 2-4 weeks, or if the temperature continues to drop, the living conditions in the smaller, shallower lakes should long have stabilized. You can fish these waters while the turnaround in larger, deeper lakes continues to unfold.
- Once we can measure an even temperature across the entire water column, we can assume that conditions have more or less normalized. You can fish in any water body at this point.

At the end of this calendar period, many pike will change the size and location of their hunting grounds once more and move towards their winter quarters. Pike no longer have the luxury to remain motionless all day but must hunt actively for a meal. Consequently, we are more likely to catch a pike if we catch them in the act of stalking prey.

6.11 Cold temperatures - the winter is calling

Water temperature: < 50°F (10°C)

Do not confuse this period with the beginning of winter. The cold period often begins in autumn. At the start of this period, the energy intake of fish is at an all year high. Whether prey or predator, they all have to gain weight to survive the coming long winter months. All pike should be actively feeding at the beginning of this period. Especially the larger males have to make up for their weight loss during the summer months and hunt regularly. By the beginning of the spawning season, some will have gained about 25% in weight.

Does this not contradict the statement that pike do not feed eat as much in cold temperatures (chapter 3.3.4 „How much time passes between meals?“ on page 32)?

No, quite the opposite. The metabolism of pike will continue to decline as temperatures fall. However, as the food intake remains the same and sometimes even rises, more energy is left to build up fat. The nutrients are sufficient for a longer period of

time. In other words, when pike feed at this time of the year, they consume more than they need to preserve their weight. The excess of calories gets converted into fat.

Between the middle and the end of the cold-period, with the water temperature below 43°F (6°C), the pike start to scale down their food intake—their energy intake still slightly exceeds their energy demands. We refer you back to chapters 3.3.3 and 3.3.4 on page 31ff to read more on this. Pike now feed less and less. Sometimes days or even weeks can pass between meals. As difficult as this might be to hear for us hard-boiled anglers, that is the truth.

6.11.1 Winter territories

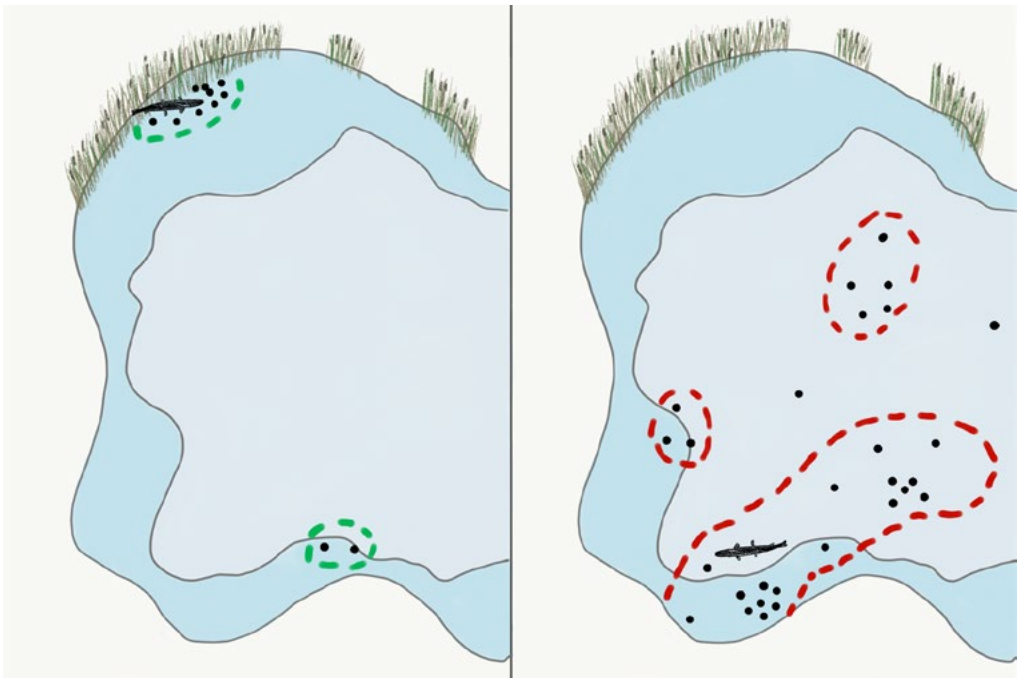


Figure 6.73—Pike territories in winter

Most of the pike now occupy their winter territories. They have adapted their behavior to the winter temperatures. The winter territories are sometimes quite different from those in summer. While some pike, according to various studies, move even closer to the shore and reduce the size of their territory, others increase their radius of action and cover long distances. We know that pike can have multiple territories between which they constantly move in the winter.

Accordingly, it is hard to make a definitive statement on the ultimate winter hotspot for pike. There will always be multiple hotspots, each of which attracts the pike for other reasons. The size of the winter territories seems to depend on the pike and the size of the water body. After all, it would be quite crazy if all anglers were standing in one line, waiting for their turn on that one magical hotspot.

In smaller water bodies, pike occupy smaller territories. In larger ones, the territories are likely bigger. We can use this as a general rule. Whether all pike follow their prey, we do not know with certainty, as some pike remain close to their summer habitats even in winter. Of course, that might just be because not all prey fish act according to the norm either. For example, roaches of different water bodies, just like pike, do not display the same behavioral patterns. On top of that, prey fish are not equally abundant in all waters. For this reason, it is logical for pike to adapt to their environment and to move to the best spots available.

The distance pike move from their summer habitats varies greatly. However, there are a few clues that allow us to gain insight into the possible or probable behavior of the pike. The period of cold temperatures is a time of stability for pike. It is the longest time of the year, and the temperature of the water column remains pretty much constant. The prey availability does not fluctuate much either. It is generally low since 90% of the fish hatched last year did not survive the first year. Most prey fish will also feed little and, unlike pike, will not gain weight. Their growth slows down considerably, and their size hardly changes.

For this reason, the pike does not have to adapt its prey preferences or hunting strategy during the entire winter. Furthermore, there are fewer barriers in the water than in summer. By this, we mean the thermal stratification, which in some water bodies, restricted the pike habitat in summer.

The vegetation has receded considerably, and cannibalism is virtually non-existent. Pike visit the open water more often now. Medium-sized pike are no longer dependent on the shore and vegetation. If pike leave their territory, it may be for a shorter or longer period of time. Some leave for a short time to feed, while others take longer trips to the opposite shore or the depths of the lake. The behaviors of the pike fluctuate greatly.

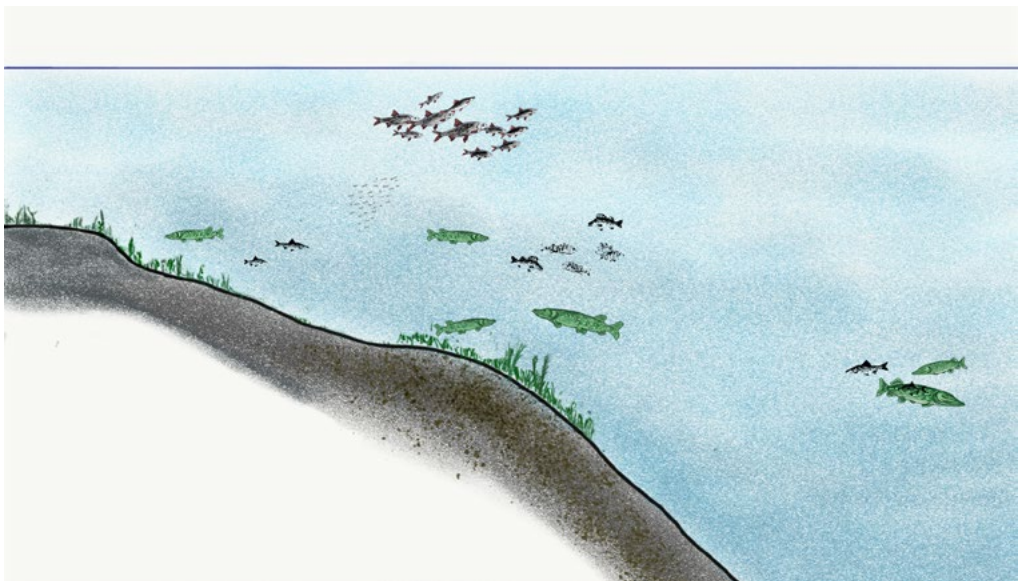


Figure 6.74—Less vegetation

Prey and pike search for vegetation in the winter, too. Reeds or receding underwater plants are both attractive. Not all underwater plants die in autumn. How underwater plants survive the winter also varies. Some recede while still covering larger areas. If you know where the underwater vegetation remains, you have a big advantage in the cold season. Pike like to stay above these remaining overgrown areas. Dead vegetation at depths of 10-13ft (3-4m) can also attract pike. However, it is important that the oxygen concentration is sufficient. In principle, nutrient-poor waters have fewer oxygen problems than nutrient-rich waters.

However, more space for the pike does not automatically translate to more traveling. Quite the opposite. Pike move within their territory at different frequencies and distances. Researchers measured distances of around 10-100ft (3-30m) per hour. In contrast to summer, the pike move evenly throughout the day. Pike also hunt more often during the day now. That means we no longer have to restrict our fishing to dawn or dusk.

If you still have your boat in the water, you can also follow the pike into the open water. Many prey fish concentrate in the deep holes and pike will be in their vicinity.

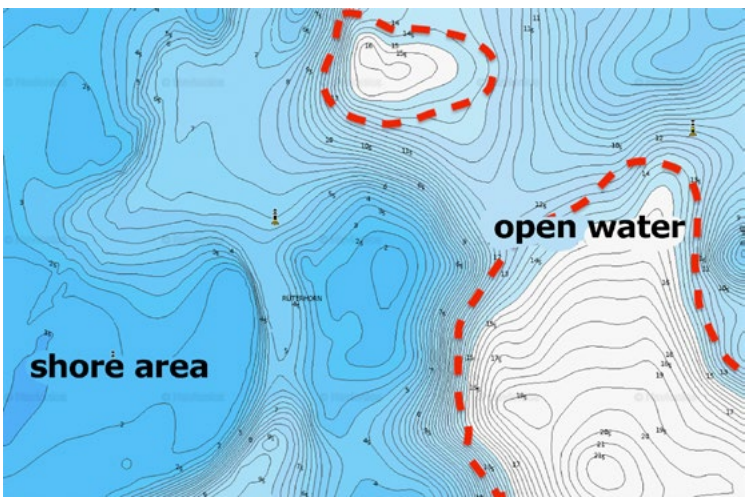


Figure 6.75—Differently large deep holes hold different numbers of fish

In larger lakes, pike are more likely to move from their summer territories relative to their conspecifics that live in smaller water bodies. In contrast to the summer, a pike‘s radius of action can increase by a factor of two to three. It is a fact that the prey availability and the structure of the respective water have a great influence on the pike‘s movements and the size of its territory. Pike are no longer restricted to the shore areas and can explore the open water if they wish. In general, those spots that house the prey, also attract the large, active predators.

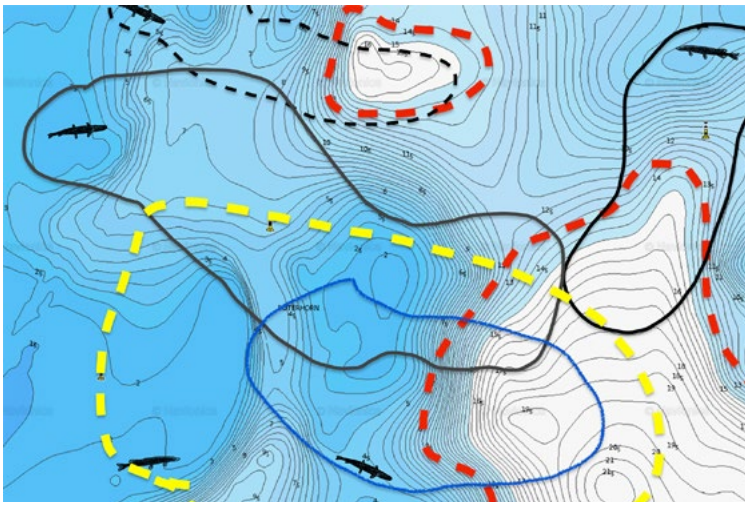


Figure 6.76—Pike territories intersect

Water bodies differ in their soil structures. If the prey fish stay at different depths, the radius of action of active pike is also scattered. If a water body contains only one or two hibernation sites, we can assume with confidence that multiple pike territories border on these areas.

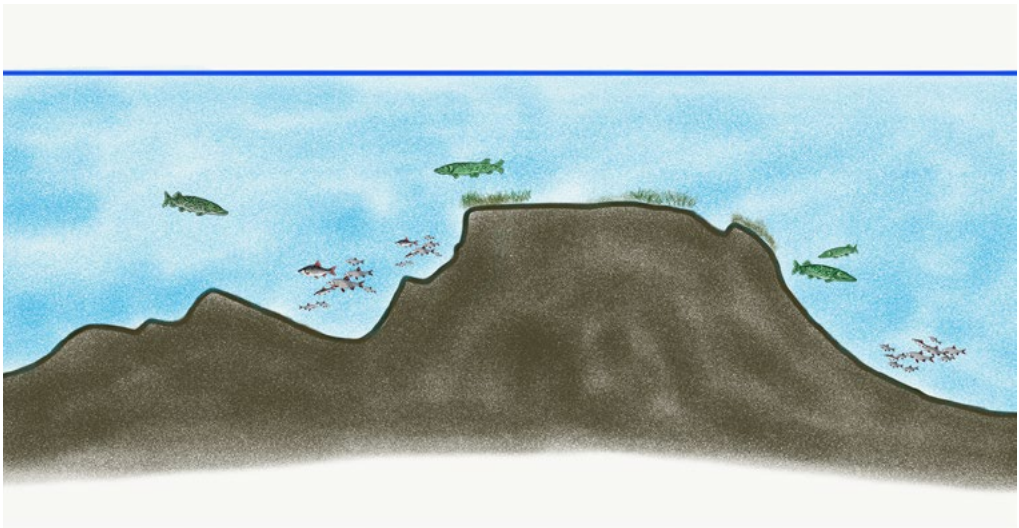


Figure 6.77—Underwater plateaus in winter

The large underwater plateaus in open water are no longer necessarily good hotspots. Most pike that spent their summer there, for example, to escape fishing pressure, move closer to the edges of these plateaus for the winter. The humps in the open water often lie close to holes in which the prey fish now concentrate. The edges of these plateaus with the adjacent holes thus form good locations for the pike. From there they reach the warm, deep water and the hibernation quarters of the prey fish. The path to the surface is short, too. Some pike in the open water become more active

and swim around at the edges, while others look for stable precincts at the edges towards the shores.

As the winter progresses, the pike's metabolism declines further. Many pike eat irregularly now. Often several weeks pass between meals. The activity of some pike decreases noticeably with falling temperatures. The weight gain slowly decreases but does not stop. Pike are one of the few freshwater fish species that can gain weight even in winter.

6.11.2 Do all pike change their territory?

The start of winter is one of two firmly defined periods at which pike regularly switch territories. Of course, there are always exceptions, because some areas might have equally good conditions in winter as in summer. Pike with a body length of more than about 15" (40cm) are no longer bound to the shore as much as smaller pike. They can swim around much more freely in the winter months, as the risk of falling prey to other predators is marginal now. It is interesting to note that 70-90% of the alive pike will not survive the time until spawning begins. These pike cannot leave the shore zones yet, and life in the shallows is very dangerous in winter. Hunger and ice formation can have devastating effects on many of the small pike.

Both bigger territories and longer travel distances cause pike to cross paths more frequently. However, these meetings seldom end in death or injury as both cannibalism and food competition are unlikely at this time of the year.

The more the cold season or winter progresses, the more a role the oxygen concentration plays for the larger pike. Since the water hardly circulates in winter, fish and decomposing plants slowly consume the oxygen in deep waters. Depending on the water, this can become increasingly strenuous for the fish. Fish in eutrophic and polytrophic waters are more likely to feel the effects. As a result, many pike migrate during the day towards the surface, towards the sun. Here in the upper part of the water, the oxygen concentration is better because the water is constantly mixing with air. If we look at the entire water column, the proportion of oxygen near the surface is probably greater than at depth.

6.11.3 Baits

Since the metabolism of the pike has adapted to the ambient temperature, we have to maneuver our baits accordingly. At the beginning of the cold period, with water temperatures of about 50°F (10°C), active and fast baits are preferable. In any case, mixing up speed and appearance is a must! As the cold season progresses, we should move our baits slower and slower. Letting the bait rest for a while is always worth a try. At the lowest temperatures, pike will not sprint over longer distances unless they have to. Prey that appears as easy is the preferred choice for pike now—they look for dead, sick or careless fish. Most of the time, however, they will not feed at all. Slow-moving baits are our best option to persuade them to have a snack in between.

Instead of baits such as crankbaits, which cause a lot of noise, we should use lightly weighted rubber fish or wobblers that run at a similar depth. Wobblers that sink slightly

or rise slowly when you stop cranking are great. The emphasis here is on slow—the shovel will help get them to the right depth. During pauses, they can rise slowly or sink slowly, depending on the type of wobbler. With wobblers, you can fish a large section of the water column.

We can pull so-called floating wobblers into the depth and leave them there. These baits can stay in the water for an extremely long time. However, the dead baitfish is also a good choice in winter. The only disadvantage is that you have to keep yourself warm. Having to wait a long time for a bite can be uncomfortable at the cold temperatures. Active casting and reeling keep us warm at least.

Remember

The time of cold temperatures begins without causing us anglers much trouble. The pike are in feeding mode and are filling their bellies. We can try out all the baits in our bait box and move them swiftly and actively. A change to bigger baits makes more and more sense as time goes on. It should be noted that in some waters, prey fish can become scarce. Affected pike will increasingly resort to alternative prey.

The colder it gets, the lower the fishing pressure on the pike. That is another reason why larger, experienced pike, in particular, may become more careless now. Anyone who thinks that pike are too stupid to notice the fishing pressure is wrong. Studies have shown that pike have a memory. We will write on this subject later this year.

With water temperatures below 43-45°F (6-7°C), we should continue to slow down the movement of our baits. Pike continue to feed, but not as much. Preference is given to easy prey.

One more tip:

If the temperatures rise due to an unforeseen warm period, this can activate the predators enormously. Many pike will use the slightly warmer water for extensive feeding—a rise in water temperature from 34-39°F (1-4°C) is enough! So, we anglers can use a prolonged period of good weather for more than just long walks.

6.12 Comparison of pike territories

As the saying goes, „Pictures say more than a thousand words.“ Let‘s take a look at how the territories of six pike changed from summer to winter. The time next to an arrow represents the travel time from one point to the other and back.

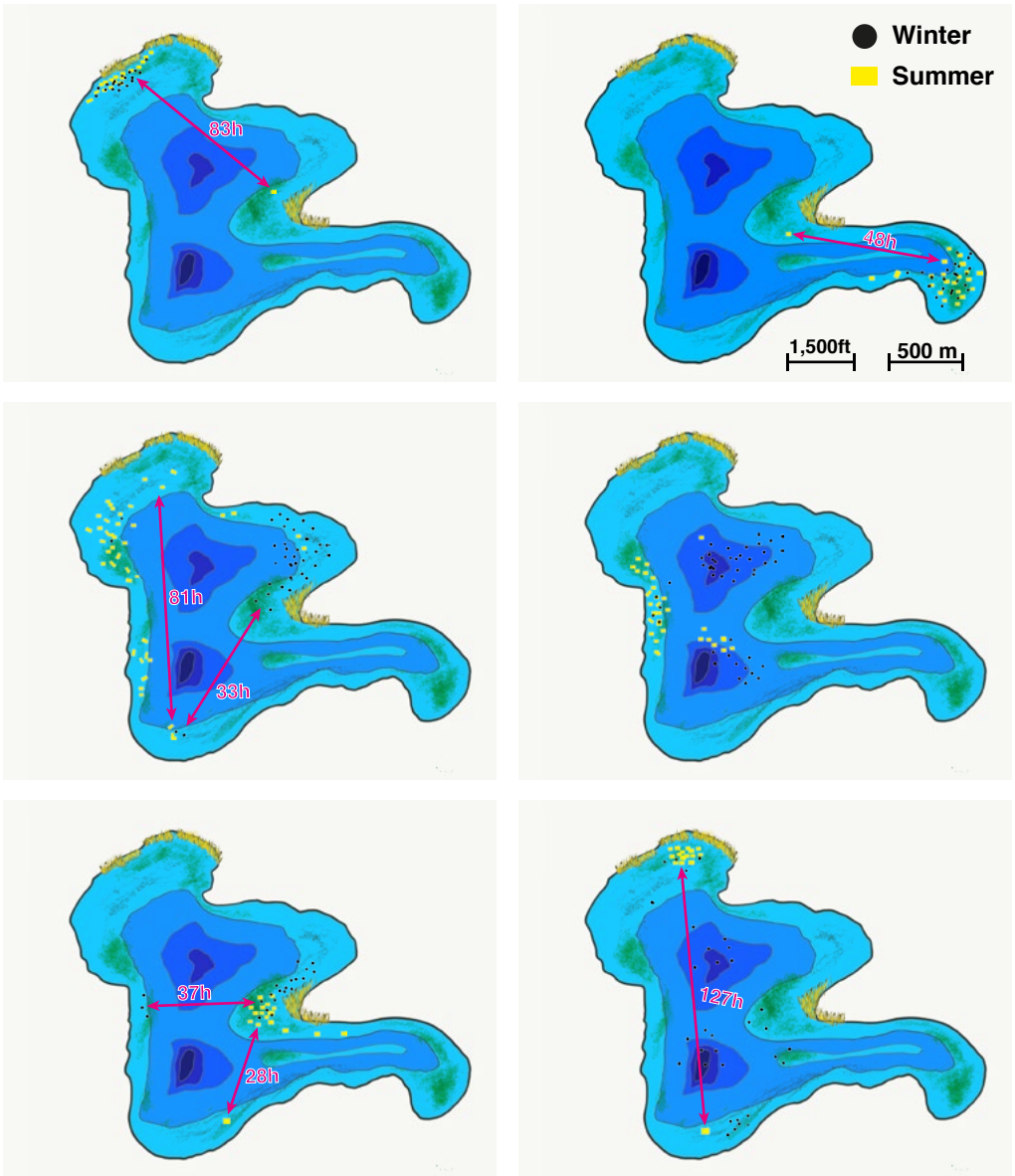


Figure 6.78—6 pike territories

Chapter 7

Special features of flowing waters

7.1 The pike and flowing water

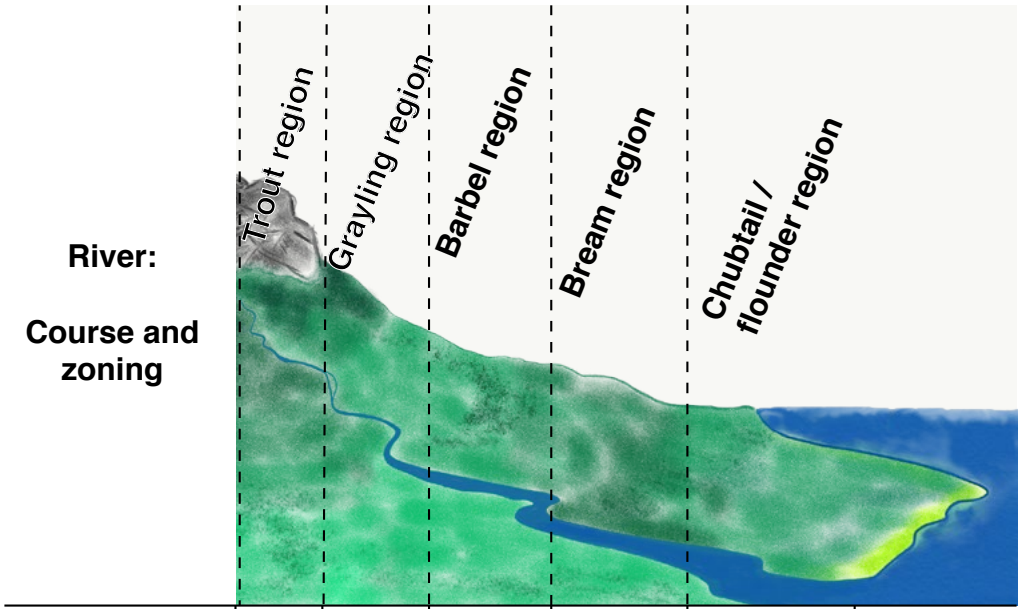
Of course, pike that live in rivers display similar behaviors to those that live in standing waters. They hunt the same prey, and they prefer to attack from an ambushing position. However, of course, their behavior deviates in some aspects.

7.2 Background knowledge

Rivers differ substantially from standing waters. Flowing water requires its inhabitants to make some special adaptations to the habitat. A river does not generally provide a good habitat for pike, as pike do not cope well with the current—the current inhibits the pike during their hunt. Sometimes it is also more difficult for pike in rivers to reach their spawning grounds—travel distances of up to 30mi (50km) have been recorded. Rising and falling water levels can transform the pike‘s habitat within a few hours or days. Especially for young pike, these conditions are problematic so that humans sometimes have to place them artificially in rivers.

Another reason why rivers do not always offer optimal conditions for pike is that humans are increasingly interfering with the natural course of rivers. Flood zones get drained or reduced in size, while solid dams protect us from flooding. These straightenings and fortifications of the river banks further limit the habitat of many fish that depend on rich vegetation. The following chapters should prepare us sufficiently if we wish to fish for pike in rivers.

7.2.1 The course of a river



Slope (%)		10-0,45	0,75-0,13	0,3-0,03	0,1-0,0	tidal influence
Temperature	°F	41-50	46-57	54-64	61-68	> 68
	°C	5-10	8-14	12-18	16-20	> 20
Oxygen level		Very rich	Rich	High (surface) decreasing to the sole	Sufficient (surface), deficient at the sole	
Cross-section of river						
Dominant sediment		Stone	Coarse gravel	Fine gravel	Sand	Silt

Figure 7.1—River zones

Rivers run from the source to the mouth of the river, sometimes for hundreds of miles / kilometers. The rivers vary in width, depth, flow velocity, water quality and the composition of their banks and river bed. Different species of fish live in different regions of a river.

In the mountains near the source, the river bed is often stony. The water is cool and oxygen-rich and therefore offers the best living conditions for fish with high oxygen demand. That changes downstream and other fish species increasingly dominate the changing habitat. Scientists classify the different sections of a river according to the dominant fish species.

The nutrient content varies greatly over the course of the river. While the water in the mountains—in the trout and grayling regions—is clearer, more and more nutrients and sediments dissolve in the lowland areas, where the bottom of the water consists of more soft materials. The enrichment with nutrients and their constant transport create ideal living conditions for many fish species. The river eutrophicates towards the estuary. The number of fish species and the vegetation increase as well.

Pike find the best living conditions in the barbel and bream region. The water is rich in prey and vegetation. The visibility conditions allow the pike to hunt successfully. Since the slope of the river gradually decreases, there are numerous flood zones which offer the best conditions for spawning.

Towards the estuary, where the bottom of a river often becomes soft and muddy, the flow velocity of a river often rises sharply, and the water can become turbid. Visual predators such as pike rarely find good hunting conditions in muddy estuaries. The exception here is brackish water, such as in the Greifswald Bodden. In the Greifswald Bodden itself, where freshwater and seawater mix, the visibility conditions for pike are ideal, and the slight salt content does not affect the pike.

Humanity has a strong influence on rivers because we use them as a means of transport and straighten them. We dam the water and determine the water level. Natural river banks often give way to artificial ones. That alters the flow velocity and the nutrient content of the water. Rivers with a width of a few feet / meters or a few hundred feet / meters can represent completely different living conditions for the pike and their prey.

7.2.2 The classification of rivers

Imperial System

River size	Average flow rate (gpm)	Catchment area (mile²)	River width (ft)	River order
very large streams	> 160 m	> 400,000	> 5,000	> 10
large streams	16 – 160 m	40,000–400,000	2,500–5,000	7–11
streams	1.6 – 16 m	4,000 –40,000	650–2,500	6–9
rivers	160 – 1,600 k	400–4,000	130–650	4–7
small rivers	16 – 160 k	40–400	25–130	3–6
creeks	1.6 – 16 k	4–40	3–25	2–5
small creeks	< 1.6 k	< 4	< 3	1–3

Metric System

River size	Average flow rate (m^3/s)	Catchment area (km^2)	River width (m)	River order
very large streams	> 10,000	> 1,000,000	> 1,500	> 10
large streams	1,000–10,000	100,000–1 Mio,	800–1,500	7–11
streams	100–1,000	10,000–100,000	200–800	6–9
rivers	10–100	1,000–10,000	40–200	4–7
small rivers	1–10	100–1,000	8–40	3–6
creeks	0,1–1	10–100	1–8	2–5
small creeks	< 0,1	< 10	< 1	1–3

7.2.3 Flow velocity - the key to catching pike

Just like standing waters, we can differentiate rivers along many variables. The greatest influence on the pike is the flow velocity, meaning how fast water passes a certain section of the river in a given time. Why this variable is so important, we can deduce from the swimming ability of the pike.

The worst swimmer ever.

Well, the pike is not a terrible swimmer but certainly not the best in flowing water. To get an idea of the pike‘s swimming ability in the current, a few numbers might help: At a flow velocity of 0.8 ft/s (0.25 m/s), a pike of about 10“ (50cm) length swimming against the current takes about 10 minutes for a distance of 330ft (100m). So it moves at 6.3 inches a second (16cm/s). If it were to maintain this speed, it would become completely exhausted after about 100 minutes. Two exciting questions arise from this short example:

- How does the pike compare in swimming speed to other fish?
- Is a flow velocity of 0.8 ft/s (0.25 m/s) high or not?

Question 1 - Swimming ability of other fish

It is interesting to compare the swimming ability of a pike with other fish, as it helps us to determine where in a river the pike will stay. That helps us to identify the ideal current for pike. Let‘s take small pike as an example. Smaller pike of 4-12“ (10-30cm) in length are less able to cope with a current. For them to be comfortable, the flow velocity should be between 0.3-0.6 ft/s (0.1-0.2 m/s). At higher flow velocities the river would carry the smaller pike away.

To cover longer distances against a stronger current, the pike would have to exert much effort, which only few will do. They would lose too much energy and potentially lack the energy to hunt at a later point. They would then run the risk of starvation or of ending up as prey themselves. The young pike are thus chained to their spawning

grounds for a certain period of time. As a result, few adult pike cross paths with their young conspecifics in a river system.

If we compare the swimming ability of the pike with that of zander, we notice the superiority of that river predator. A 10“ (25cm) small zander can take on a 20“ (50cm) pike in terms of swimming ability against a current. An 32“ (80cm) zander can cover 330ft (100m) against the current in 10 minutes, even at a flow velocity of 2.6 ft/s (0.8 m/s), which is more than three times as high.

Remember

The size of the pike determines how and where it can stay in the river. The optimum habitat for pike in a river has a flow velocity of up to 1 ft/s (0.3 m/s). Larger pike have more energy to fight the current than smaller pike. For this reason, they can usually handle a flow velocity of up to 1.6 ft/s (0.5 m/s) well. Consequently, they are more flexible in their choice of habitat.

To answer the second question, we need more background information on how the current behaves in a river.

7.2.4 Flow direction of a river

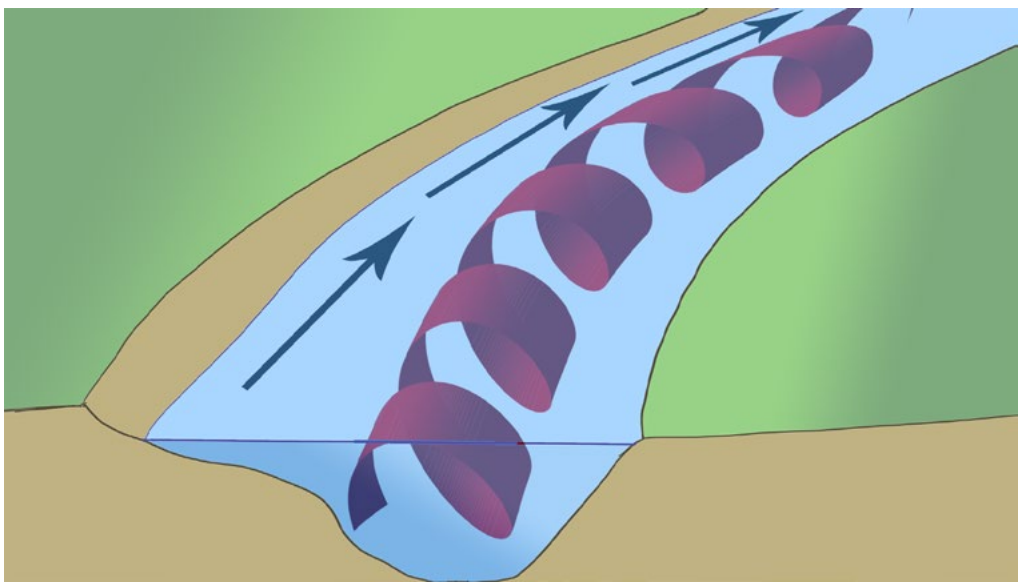


Figure 7.2—Spiralling current of the river

Anyone who assumes that the water in a river simply flows in a straight direction is mistaken. The water masses are constantly in motion and are also subject to the Coriolis force—remember chapter 4.6 „Wind“ on page 91. The rotation of the earth affects moving water. In rivers, because the water is constantly in motion, it gets moved from

one side of the river to the other. The fish follow this back and forth movement, using the current to preserve energy. The fact that rivers never have a straight river bed but meander through the landscape is a result of this phenomenon. The bends of the river and the varying strength of the current due to larger waves are clearly visible.

Figure 7.3—Twisting river

One particularly notices the formation of the steep banks at river bends. Here the forces have the greatest effect. Sometimes the riverbank is steeper on the left and sometimes steeper on the right. In Scandinavia, the Coriolis force has less effect since the speed of the earth‘s rotation is slower in northern latitudes than in southern regions. Various other influences, for example, friction between the river bed and water or obstacles that interrupt the flow, increase or decrease this effect. If the circulating water hits a bank side, it slows down. That is important for us to notice, as pike prefer a slower current.

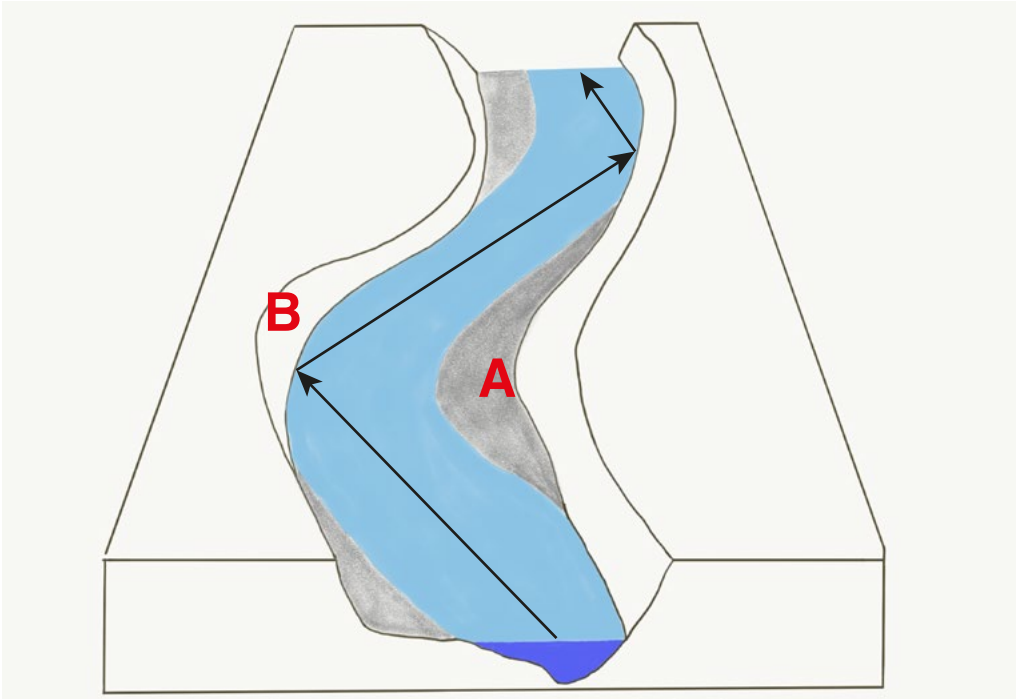


Figure 7.4—Deposition as a result of the current

Due to the varying strength of the currents, sediments are released from one river bank and deposited elsewhere. These sediments form the slip-off slope (A), which runs flat to the middle of the river. The steeply sloping bank is called the river cliff (B). Here, the water hits the bank with full force and more or less erodes it.

7.2.5 The cross-section of a river

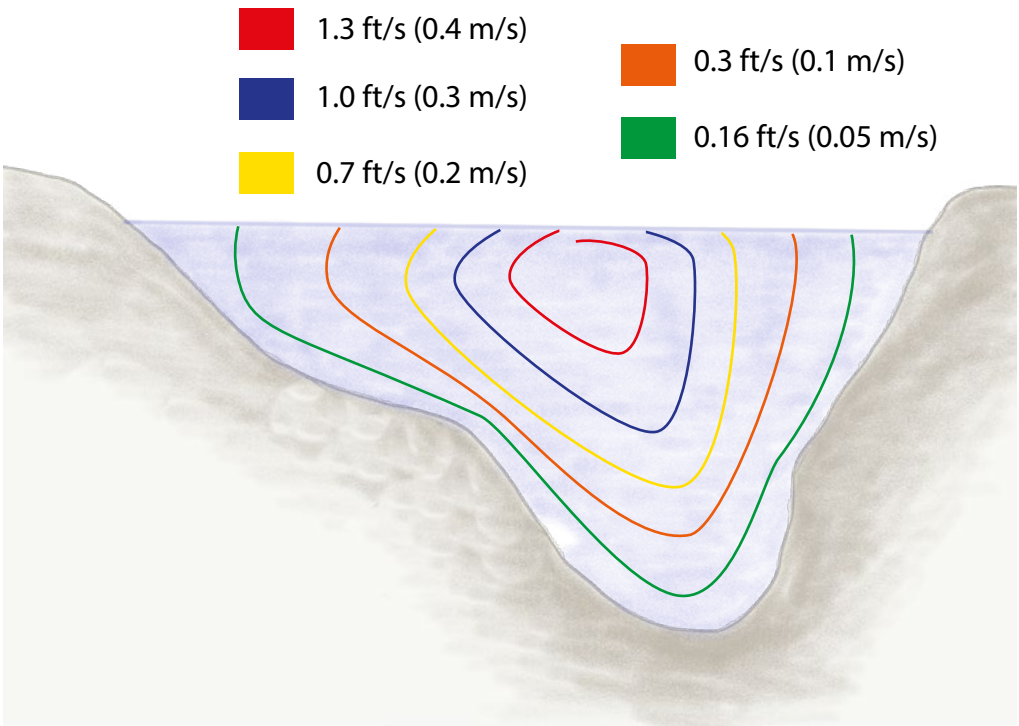


Figure 7.5—Exemplary flow velocities within the river

If we look at the cross-section of the river, we can see the different flow velocities of the water. The flow velocity is not always fastest at the same point. For example, in the middle of the river, the flow velocity is sometimes fastest further down, left or right. The pike generally prefers the low speeds near the bank edges, the obstacles or the bottom. Many prey fish inhabit these spots and the vegetation also finds sufficient support.

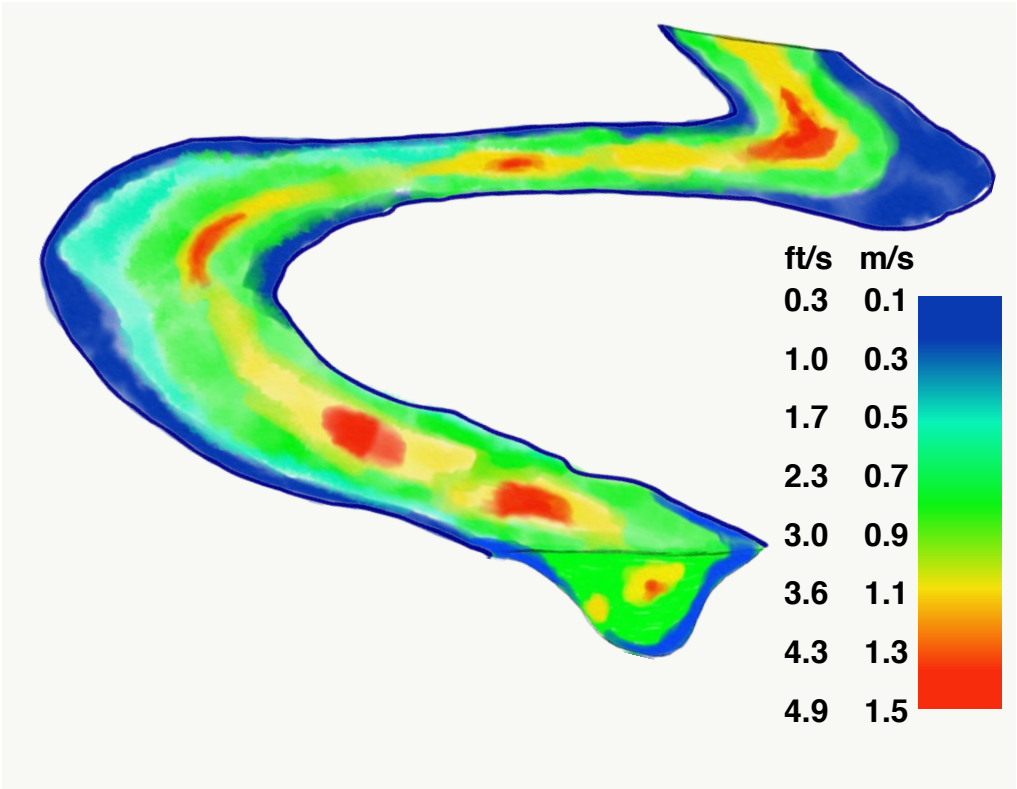


Figure 7.6—Exemplary flow velocities along the river course

We now know that the flow velocity in rivers can change even at short intervals. Figure 7.6 gives us a very good impression of this. The deep blue color indicates the optimal habitat for the pike where they can rest and hunt (about < 1 ft/s (0.3 m/s)). We ourselves were surprised how small this area can be. The shore area is the ultimate hotspot and pike will use these areas primarily for hunting and resting. Of course, pike also swim through sections with stronger currents, whereby the larger pike can do better than the smaller ones. Generally, most pike hunt rarely in a stronger current, making them less susceptible to our baits.

7.2.6 Different flow velocities in rivers

Different river bed structures have a different impact on the flow velocity for a given river section. In order to identify pike hotspots, we have to study each river section separately. For simplicity, we use general statements such as:

- Where the water meets the shore or the bottom, it slows down.
- In shallow, narrow river beds, water flows more slowly than in deep and wider ones. Here, the water meets less resistance.
- At high tide, water flows faster than at low tide.
- Obstacles slow down the water. Figure 7.6 on page 214 clearly illustrates that the flow velocity is often fastest in the center of a river.

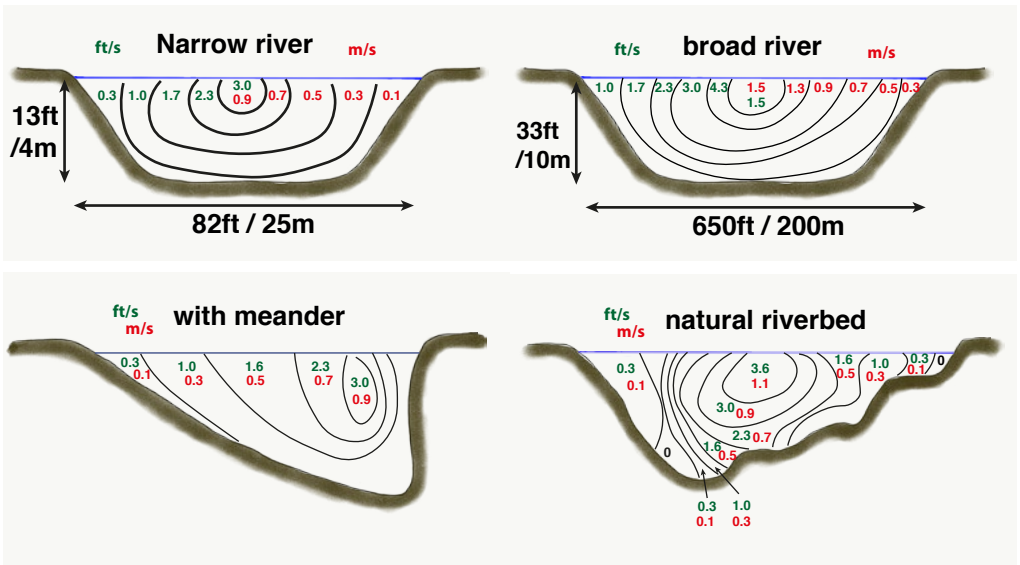


Figure 7.7—Cross-sections of rivers including their respective flow velocities

Remember

In places where the water is rapidly moving towards the estuary, fish must expend more energy to withstand the current. Various pike avoid this strong current, especially at the beginning of autumn and in spring, during some activities. They instinctively visit the slow-flowing zones to rest and hunt. You can often see how fast the water flows in different spots, but the differences only become clear once you have reference points. If you throw a few leaves or breadcrumbs into the water, you will be able to distinguish between currents of varying strength.

With fast flowing water, pike stay near tributaries and side arms or close to the shore. Some pike even reduce their daily migrations to a minimum. If a pike lives in one of the larger rivers, we have to pay even more attention to the current. That allows us to narrow down potential hotspots precisely, as gradual currents are more frequent in large rivers.

7.3 The pike‘s territory

In rivers, too, each pike inhabits one or more territories. Most are more or less stationary during certain seasons, such as the summer months. Nevertheless, pike in rivers also undertake long migrations. The distances that river pike cover differ significantly in length from those of pike in standing waters. During the spawning season alone, they sometimes travel many miles / kilometers.

While young and adult pike often occupy the same shore areas in lakes, river pike hunt less frequently in their spawning grounds. After spawning, they leave the spawning grounds and occupy new territories.

Switching between summer and winter quarters can also take some time. Pike are a little more mobile in rivers than in stagnant waters. They migrate more often from one area to another. However, within their territory, they are commonly considered stationary predators. The daily distances that river pike cover are usually limited to a few hundred feet / meters—at least this applies to the majority of pike. When swimming against the current, the distances covered are shorter than when the pike swim with the current.

Pike that live in rivers may behave differently than pike in stagnant waters. The river environment requires greater adaptability from the inhabitants than a stagnant water body. While some pike cover long distances, others do exactly the opposite. We have records from the River Frome, England, where some of the marked pike covered a distance of 530ft (162m) while others traveled for 19,409ft (5,916m) in the same river. Those are big differences in terms of the radius of action.

Additionally, the behavior of the pike also changes due to external influences. We can identify different calendar periods in which the pike become noticeably more stationary. The lack of prey from the beginning of the cold season to the beginning of the spawning season can lead to a larger radius of action for some river pike—in Central Europe, usually from late October to early December. Less prey means that the pike

have to travel more to feed. Conversely, this also means that if there is a section in the river that offers enough prey, the pike that have their hunting grounds in those spots do not have to move as much. He who finds the resting spots of the prey also finds the pike.

We can recognize these calendar periods by the water temperature. Some pike are most active in rivers with water temperatures up to 50°F (10°C). If the water temperature is above 50°F (10°C), the pike are less likely to migrate and become noticeably more stationary.

Remember

The more pronounced stationary behavior of many pike at water temperatures above 50°F (10°C) has an impact on our fishing strategy in a river. We must adapt to the pike's behavior when the water is warmer. In these conditions, similar to standing waters, it is promising to fish each spot strategically to get the bait as close as possible to a pike.

7.4 Regulation of rivers

People intervene deeply in the structures of rivers. We change the river bed, build dams, lay one flooding area, and determine another to become the new flooding zone. With stones, concrete, and wood we want to master the situation and continue to regulate. Anyone who wants to fish for pike must distinguish between regulated and unregulated rivers and sections of rivers.

7.4.1 Unregulated rivers

Biodiversity in an unregulated river section is much higher than in a regulated one. Unregulated means that man has not changed the natural course of the river through installations and alterations. The river bed is the way nature created it, with all its advantages and disadvantages. Spring floods flood large areas, and summer drought cuts off some water points from the main river, especially in smaller rivers. The current is not so strong in many areas. The environment offers ideal spawning grounds and an optimal habitat for young pike. Growth in the first year is likely to be above average relative to pike in other waters of the same latitude.

Figure 7.8—Unregulated river

Unregulated river sections are usually narrow and shallow and are hardly ever used commercially, for instance by shipping. For us, many potential pike hotspots are visible to the naked eye, either by underwater plants reaching to the surface or by trees or branches hanging into the water.

In the warm season, when the river carries less water, many fish gather in the deep holes that have been created by the current. Especially for many small prey fish, the risk is very high that they fall victim to birds and other predators in the shallow water. When prey fish are concentrated together, the pike are often not far away.

If there is enough water all year round, the pike have a great habitat and find sufficient food. The size of the river and the food available throughout the year have a significant influence on the growth rate of the pike. In unregulated rivers, pike tend to reach a medium size. Even 8-10-year-old pike do not necessarily reach the 32“ (80cm) mark in smaller rivers. That is the difference between river pike and their conspecifics in stagnant waters. One reason for this is that in shallow waters, once the pike have attained a reasonable size, they become attractive targets for birds and anglers.

Bait

We can add more diversity to our bait selection in these natural areas. As the hotspots are very rich in fish, prey fish make up a big share of the pike‘s diet. Invertebrates stay in the shallow shore areas. Baits that imitate fish are often a good choice. Otherwise, you can select baits according to the guidelines we introduced in the context of the different calendar periods. A mix of fish and invertebrates should always work.

7.4.2 Regulated rivers

Regulated rivers have been altered in their course and/or in the depth of the river bed. They are often used commercially and therefore have to carry a minimum amount of water throughout the year. They are often wider and deeper. Since the river course is straighter, pike find fewer edges and corners than in unregulated river sections. Obstacles and underwater vegetation become more important for the pike.

Figure 7.9—Regulated river

The optimal living conditions are not visible to us at first sight. If you want to fish for pike in these areas, you should know the current well. It decides where the pike are and where not. Larger rivers with faster flowing water place different demands on their inhabitants than smaller and shallow ones. The fish stock is not distributed so strongly but stands more concentrated at sections with a slower current, especially edges. If we have identified a potential hotspot, we can either go fishing or use a mobile fish finder to additionally check for vegetation.

Since regulated rivers carry sufficient water throughout the year, pike can occupy deeper areas that have a slow current. They also find enough fish as prey. For this reason, these rivers might house larger pike.

Bait

The food of the pike resembles that in bigger lakes and consists for the most part of fish. Period. Prey fish, due to the depth of these rivers, are available everywhere throughout the year. The pike‘s territories can also be larger so that some switch their feeding grounds more frequently.

7.4.3 Channels

Figure 7.10—Small channel

Figure 7.11—Large channel

Channels are a special form of flowing water. They are of an artificial origin. Channels connect different waters and have a limited length. The classic division into different fish regions does not exist for channels. Since the river bed is not of a natural origin, the extensive bends of natural river beds are often missing. There are also hardly any flood zones. The purpose of channels is mostly to connect other water bodies.

Channels do not make great habitats for fish. The current is usually stronger compared to natural rivers of the same size due to the straight line and the lack of obstacles. Also, the vegetation is not as abundant. Depending on the size of the channel, pike settle, but the fish stocks are usually small in number.

Bait

Pike that live in channels have to compromise on their food, as fewer prey fish and hiding places are available. Pike therefore inevitably switch to alternative food. Invertebrates such as crabs, leeches or insect larvae take up a much larger share of the menu. Even if they provide the pike with a worse energy supply than fish, the food is sufficient for the pike to survive. However, the alternative diet can have a strong impact on their growth.

If we fish for pike in channels, we should give a little more thought to our bait selection. Fish baits promise the pike a lot of energy. Fish baits that appear as easy prey might help to stimulate the pike. Alternatively, imitations of invertebrates are suitable, too. They should definitely be present in the bait box.

7.5 Hotspots in rivers

7.5.1 Obstacles on the river bed

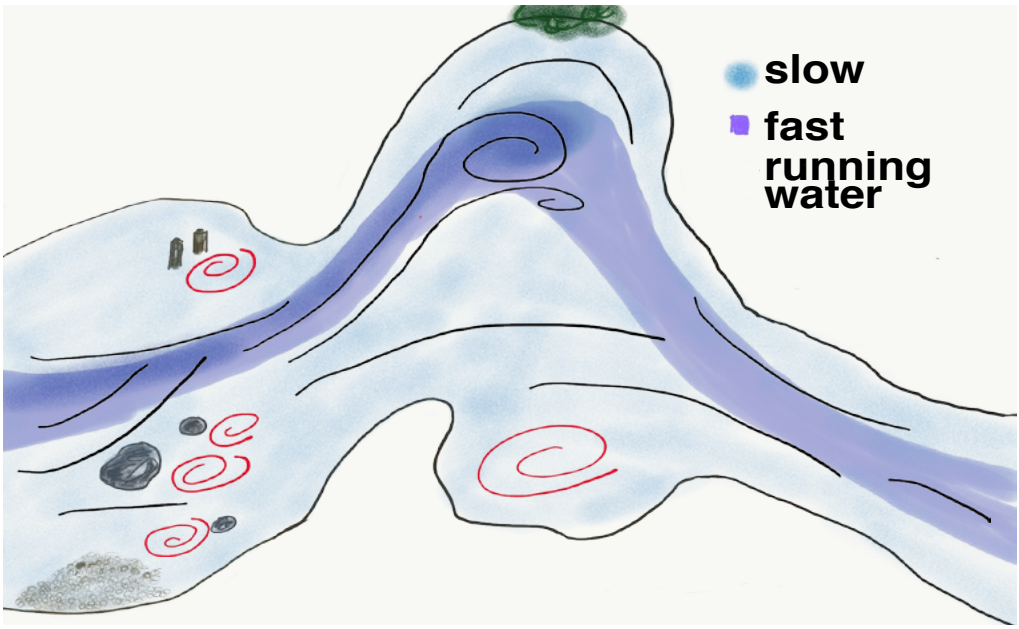


Figure 7.12—Obstacles slow down the flow velocity

The structures on the river bed and in the bank areas change the flow velocity and vice versa the flow velocity changes these structures. The deceleration of the water is caused by the friction between water molecules and the rocky bottom. The larger the structure, the more the water is affected. Pebbles, rubble or boulders are among the most common rock structures.

7.5.2 Vegetation

In rivers, too, vegetation plays a key role for the pike—pike will often remain close the vegetation. The current strongly influences which and how much vegetation can form where. In areas with a strong current, most plants find it difficult to gain a foothold. That would require a reasonably hard ground in which the roots find support. Therefore, only a few plant species will be able to settle here. Also, only a few fish species can optimally adapt to a strong current.

Areas with weak currents are much more interesting for pike fishing. Here the vegetation is diverse and abundant. That offers many fish good living conditions, especially in regard to food and protection. The pike find enough prey and cover in these spots. The vegetation can vary from river to river and change from year to year.

7.5.3 Floods and low flows

The river as habitat changes for the pike in the course of a year. The water level of a

river can vary greatly at certain times. While the water level rises in October due to heavy rainfall, the rise in spring is due to the melting snow. The more water a river carries, the faster it flows.

It has been observed in many studies that pike use a rise in water levels to relocate. Ebb and flow can also trigger pike relocation. Depending on the strength of the current, pike either occupy other territories in the main river or seek shelter in the side arms and tributaries.

Towards summer, the water level drops and the flow velocity decreases considerably. The living conditions in many rivers and sections are now excellent for pike. They stay near the rich vegetation on the bank of the mainstream. At this time of the year, pike from the mainstream migrate rarely to the flat side arms—prey fish do not visit these spots in summer as the risk to fall prey to birds or land predators is higher in the shallow water. The main river or the deeper side arms provide a good habitat for most river dwellers. Rivers carry less water in summer, which greatly reduces the flow velocity.

7.5.4 Slip-off slope or river cliff?

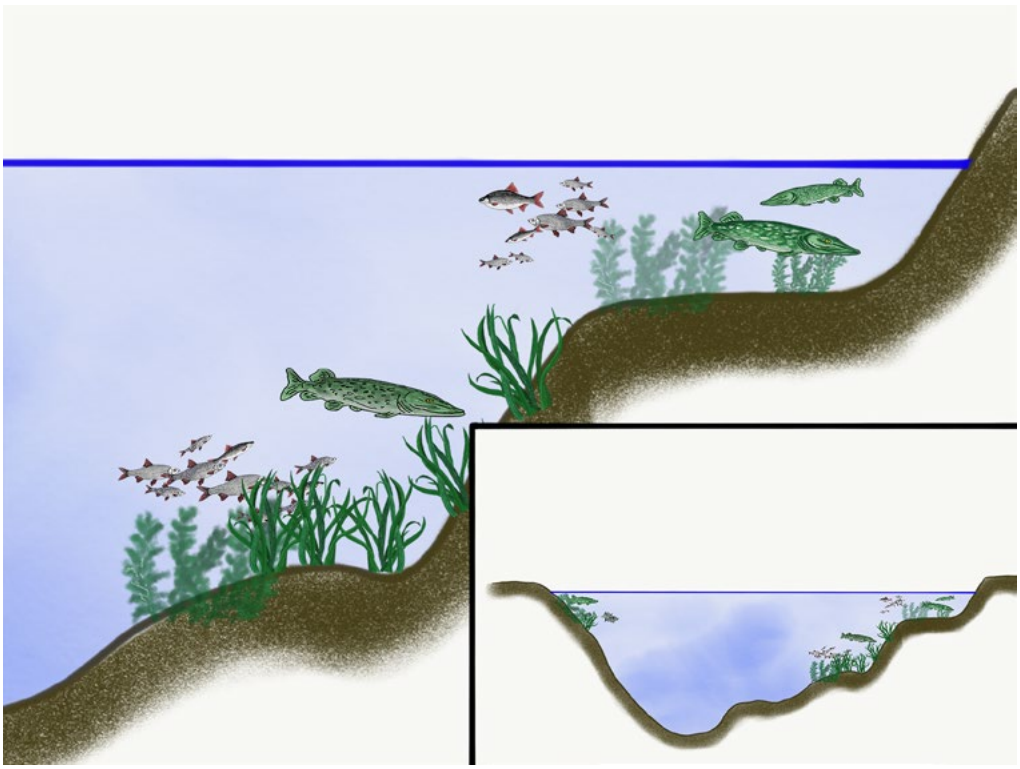


Figure 7.13—Pike and vegetation in the river

We can already guess on which side of the river pike are more likely to stay. Pike are most likely to hunt where there is a lot of prey, and they can attack from an ambushing position. So it is really quite simple to find the hotspots: Wide, sweeping shore areas

provide shelter and food for small fish. Most slip-off slopes make great hotspots. They are particularly wide and have a weak current. A slip-off slope is often the shallowest part of a riverside, so that little water meets a lot of soil. Additionally, many plants settle on the slip-off slope, and there is plenty of scrub from the shore. The effect of reducing the flow velocity by friction is greatest here. The slip-off slope as habitat attracts many small fish, which are ideal prey for pike.

Slowly descending bank areas, several feet / meters wide before the sharp drop-offs descend to the depth, ensure that pike can stay deep, but not in the strong current of the middle of the river. At these depths, prey fish are the main food source for pike and ensure rapid growth.

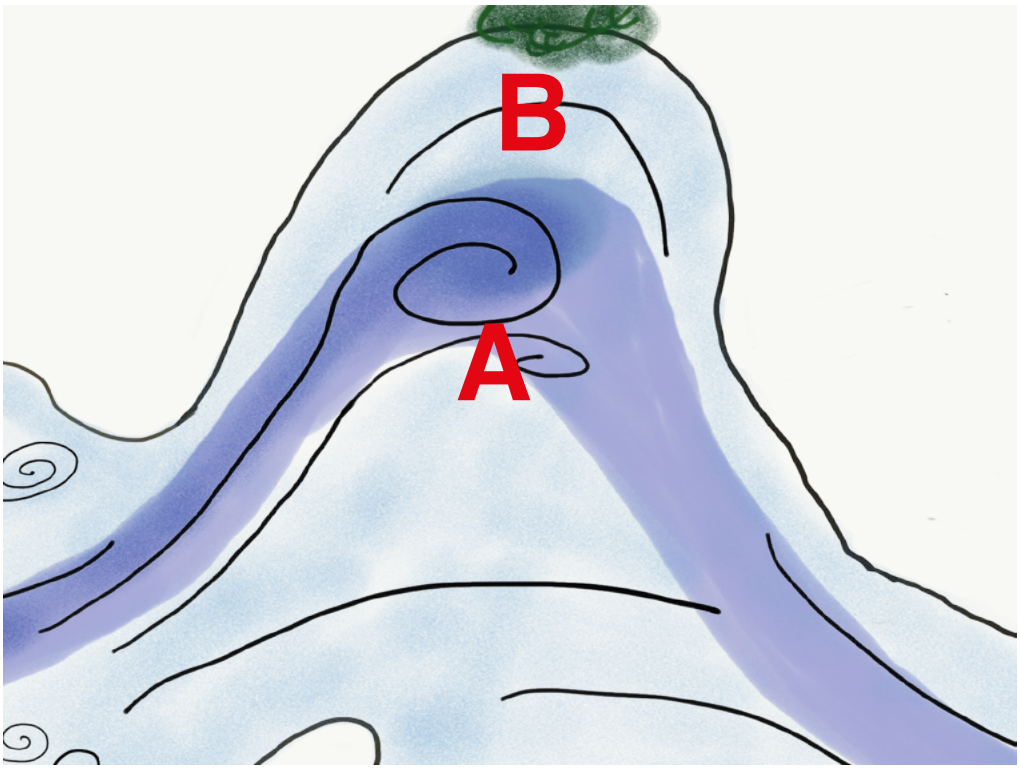


Figure 7.14—River bed with meander

The river cliff can be a great spot for pike fishing, too. Here, the water hits the shore with full force and more or less erodes it. If a meander has formed, the water in this small bay gets slowed down. The current is strong at point A in Figure 7.14 and draws many smaller fish into the depths. The outer area of the meander (point B) may have low current, as the water between points A and B swirls and greatly reduces the current. Large predators occupy these areas and wait for prey to pass by. Large pike stay here when the current is not too strong.

Remember

The flow velocity is determined on a large scale by the course of the river bed and on a small scale by obstacles such as stones, logs, branches and, of course, vegetation. They slow down the water and redirect the current by a few inches / centimeters or several feet / meters. Behind these objects, the water swirls and forms calm zones. Such changes in current make for great pike fishing hotspots. Where the current is weak, we are most likely to find pike.

Knowledge of currents is the most important aspect to pike fishing in flowing waters.

7.5.5 The shore as a hotspot

Generally, the pike like the edges and banks with their slow flowing water. But not every section of a shore or bank is a hotspot. It would be naive to expect a catch every few feet / meters along the shore.

Pike are not only fixated on the habitat water. They often orient themselves on the existing vegetation on the edge of the water. Reed acts as a magnet for pike. The only problem is that sometimes miles / kilometers of rivers are overgrown with reeds. It can be difficult to determine where the pike might stay.

From various experiments, we know, however, that eye-catching structures on the shore attract many pike. Every tree and shrub that brings variety to the seemingly monotonous shore areas are attractive. We do not know exactly why, but pike are more likely to be found near a tree or shrub on a monotonous bank than elsewhere. That makes sense in summer as these obstacles can provide shade. However, even in winter, these spots attract pike.

The stronger the current of a river, the more likely it is to draw some pike into the side arms and oxbows. Especially with the onset of snowmelt and the onset of rainy days after late summer, pike look for a weak current to hunt. At high water levels, they will spend most of their time in these spots. In adverse conditions, they can move their territories several miles / kilometers. Flat plains still offer many wetlands, ditches, channels, and an extensive network of river arms.

Editor‘s note

We prepared a detailed study for this book. It outlines pike hotspots in the shore area and explains which distinctive structures attract pike more and which do not. However, that study goes beyond the scope of this book. You can get exclusive access on the-fishfinders.com instead. To learn how to get access, have a look at the end of the book.

In the study, researchers tracked several pike habitats over a long period of time. The river system extends over 27mi (44km). Besides the vegetation on the banks, the

study reveals which side arms the pike did or did not visit for each season.

7.6 Special characteristics of river pike over the course of a year

From summer to late summer, the pike‘s territories resemble those in standing waters. They are sorted by size. The smallest pike stay in quiet areas near the spawning grounds. In the mainstream, medium-sized and larger pike occupy the edges of the banks. The larger pike often hunt where the shore area drops off into the depths.

Figure 7.15—Underwater plants in clear waters

It is important that there is enough underwater vegetation in the shallow zone of the river. Sometimes in clear water, it is easy to spot the vegetation from above. However, that is seldom the case. With a bait that you cast into the current, you can estimate the extent of the underwater vegetation. Just make sure that your bait is heavy enough to get carried along by the current but not too heavy to get caught on the river bed. Finding the balance is not an easy task.

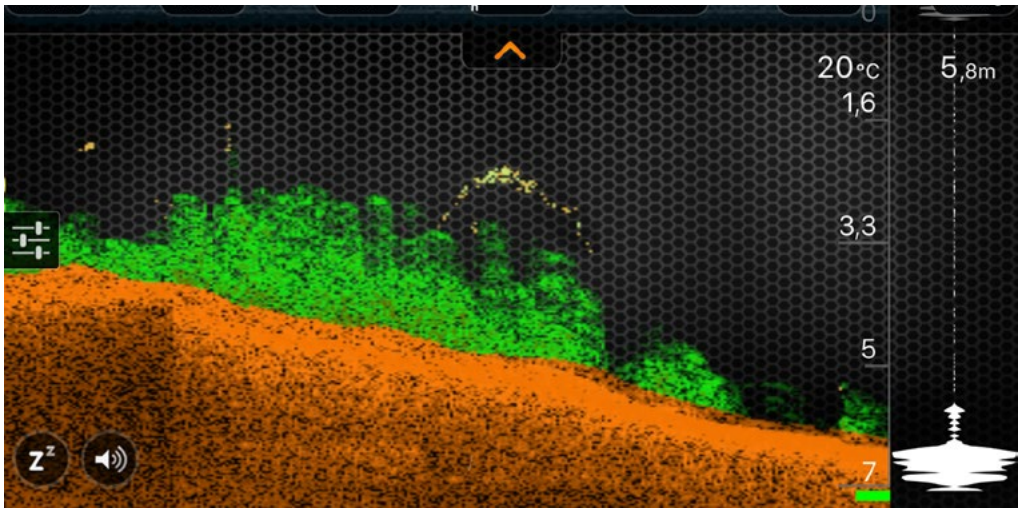


Figure 7.16—Vegetation on a gradual drop-off

For this task, we use a mobile fish finder such as the Deeper. It helps us to map the underwater structure. A mobile fish finder is particularly suitable for mapping out river banks. We simply let the current carry our Deeper for 100-130ft (30-40m). The result is an abundance of information about vegetation, edges, and fish.

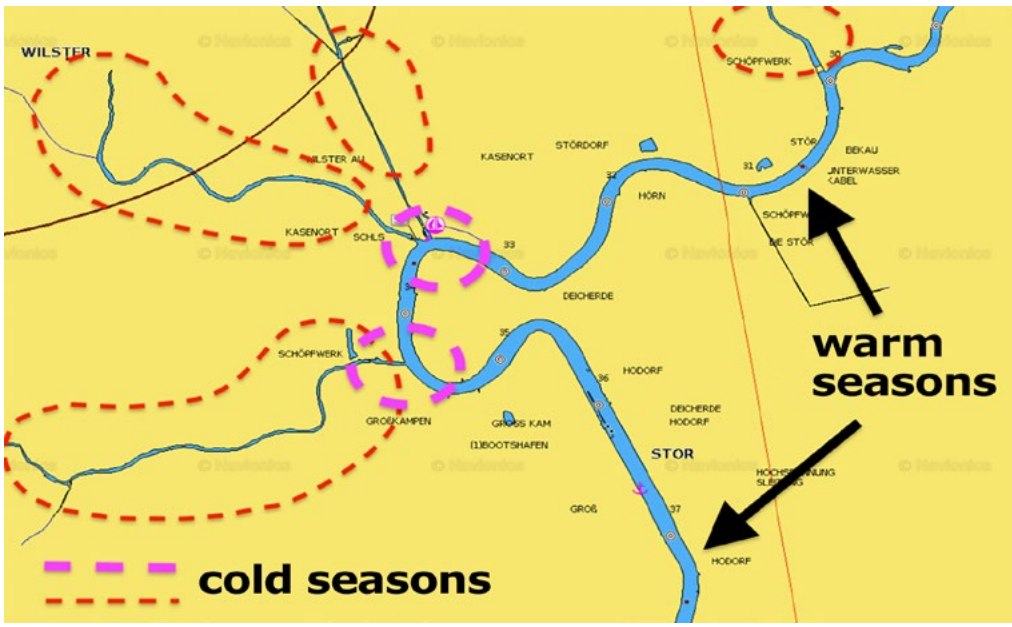


Figure 7.17—Prey and pike in the cold season

In autumn and even more so towards winter, the vegetation is declining. That means that the prey fish leave the main rivers more and more often. The pike follow to feed. We know that pike need little prey at low water temperatures. They can migrate to the

side arms to feed, and then spend several days in the mainstream in between feeding. Here they actively search for areas with low currents. Due to less vegetation, the areas with the lowest currents are those behind obstacles, close to the shore or in holes at the bottom—larger pike often occupy these spots. The larger river pike also visit these holes in summer.

Remember

Finding potential hotspots for pike in rivers is easy because areas with a high flow velocity are unappealing to pike. The immediate shore areas serve as a good habitat for many river pike.

On the other hand, it is a great challenge to precisely determine the best hotspots along the mile- / kilometer-long banks. Knowing how currents work and how pike live in flowing waters is the key to planning your fishing trip effectively. If you use this knowledge in a targeted way, you will end up with more fishing time and will probably have to cover fewer miles / kilometers to catch a few pike.

The pike must adapt to the changes in the river system throughout all seasons. Low current conditions allow the pike to hunt most effectively. He who knows to analyze currents has a big advantage fishing for river pike.

In rivers, pike are often easier for shore anglers to reach than in stagnant waters, as their territories follow the narrow edges of the shoreline. However, the rivers present us anglers with different challenges, be it in terms of fishing equipment, assembly or just the many obstacles on the way to the water, such as meadows and fences.

Conclusion & Outlook

Well, we are already at the end.

Some will be happy to get to the water finally. For the others, we have a little extra.

Not everything we have written has made it into the book.

On the one hand, that is due to the fact that for one or the other text somehow no chapter was appropriate. On the other hand, some topics were too elaborate or too specific for this general book.

The following articles you can find at www.the-fishfinders.com:

- In which months do pike feed the most?
- When is there an abundance of easy prey for the pike?
- Why are only a few pike easy to catch?
- 3 reasons why some pike are hard to catch
- Do pike remember our baits?
- How many pike do the others catch?
- Monster pike or where are the largest pike?
- Extended table to chapter 3.3.4, „How much time passes between meals?“ on page 32
- The wrong bait or the right bait?
- At which hotspots are pike more common in rivers?
- Hotspots in larger standing waters

Reflecting on this work, we can say that two facts jumped out to us the most: Not all pike are voracious, and most do not feed every day. We have to accept that. In regard to the second point, for the upcoming season, we have set ourselves the goal to fish each spot strategically, trying to get as close as possible to the local predator. We will spend more time in one place and see if we can catch more pike. Having reviewed so much data and information, we are more convinced than ever that bait selection is only one of many factors that aid us in pike fishing.

We had a great time writing this book and hope that you enjoy the result as much as we do. Dividing the hotspots according to different calendar periods will make it easier for you to plan your fishing trips going forwards. As with the first book, we ask you to rate the book fairly, please. We are in competition with established publishers and cannot rely on a large team. For those who do not know us yet, we are a team of two who work on our blog and books in our spare time. For this reason, we depend on word-of-mouth and value every recommendation.

Outlook

This book is not the end. We have a lot more material and information to tackle new and exciting projects. Since not everything is specific to a fish species, we are currently considering how to best make this knowledge available without you having to wait for another book.

We will likely distribute this knowledge online. That allows us to make everything available immediately. Above all, it enables us to write in-depth reviews of many different fish species. In our research for this book, we were especially hooked by the different behavior of the various prey fish. However, all this is still under consideration. One thing we can promise is that future publications will be cheaper than this book.

What‘s next?

„Smart Fishing - Fishing with the Deeper fish finder“ - July 2019

„Food competition - The ultimate pike bait“ - Q4 2019

„The ultimate bait course“

That‘s it! Please, leave a review online.
After that, off to the water with you. The fish are waiting!