

Do fish have a home?

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Abstract

Do you have a favorite place? One that makes you feel safe and has everything you need to survive? Now imagine you are in your favorite place and a skunk wanders in. You run away because you don't want to end up stinky.

This same thing happens to young (juvenile) fish when their favorite places get polluted or are not protected. Fish might even get caught by fishermen. A lot of fish populations are in danger because:

- too many individuals are caught
- there aren't enough safe places for juveniles to hide.

If we protect their favorite places, we might be able to keep

fish populations from decreasing.

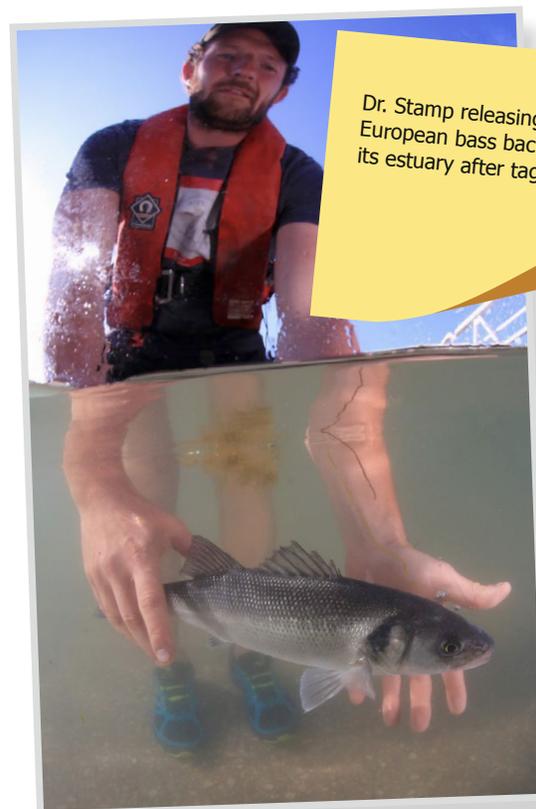
We tracked European bass (an important fish in Europe) for a year to figure out where their favorite places were. We found that most European bass stayed close to the coastal sites we caught them from. Our goal is to identify more of these coastal sites. That way, humans can protect them, and fish populations can thrive.

Introduction

European bass are important fish in the Northeast Atlantic Ocean and the Mediterranean Sea. Their population size decreased to very low levels in 2016. This was partly because of **fishing pressure**. It has recovered, but is still lower than what it was in the past. It will likely decrease again if they're not protected more.

Normally, juvenile fish grow into adults and replace the adults that are caught through fishing. This process is called **recruitment**. This is not happening very well in the European bass population.

We think European bass spend a lot of time in coastal areas like **estuaries** and sheltered bays. These coastal areas are at high risk from human activities. For example, coastal development can change the amount of nutrients and sediment in the water. Different water conditions like these can harm young fish.



Dr. Stamp releasing a European bass back to its estuary after tagging it.

It takes juvenile European bass a long time to grow into adults. They tend to stay in the estuary they live in until they are fully grown. So if their habitat gets damaged, they don't just move to another estuary.

We wanted to know how and when juvenile European bass use different coastal areas. We hope our results can help

Methods

We caught 146 European bass in three protected nursery sites in the Southwest UK (Fig. 1). We placed an **acoustic tag** inside each fish and then released it. We placed 78 receiver instruments throughout the nursery sites. Whenever a fish got close to a receiver, it recorded the time, date, and fish ID. We tracked fish movement like this for a year.

We used our data to determine:

- how much time fish spent at the protected nursery site they were originally caught in, or
- when they moved into other unprotected coastal areas.

We also calculated if these movements were related to fish size.

Results

We saw clear seasonal differences between the various nursery sites. We found:

- All fish had wider movements at some point. Some visited neighboring estuaries. The most adventurous individuals traveled to Wales, over 300 km (200 mi) away.
- 45% of wider movements were in the winter. Many of these

identify areas that will protect these fish. Protected areas could help the whole population grow, by:

- helping fish stay safe as they become adults
- helping increase recruitment.



Figure 1:

The Dart Estuary in Dartmouth, England. Estuaries are places where freshwater rivers meet the salty ocean. They provide shelter and food for lots of young ocean animals including fish.

fish were from the Dart Estuary. Most of them returned to their original nursery by the end of our study.

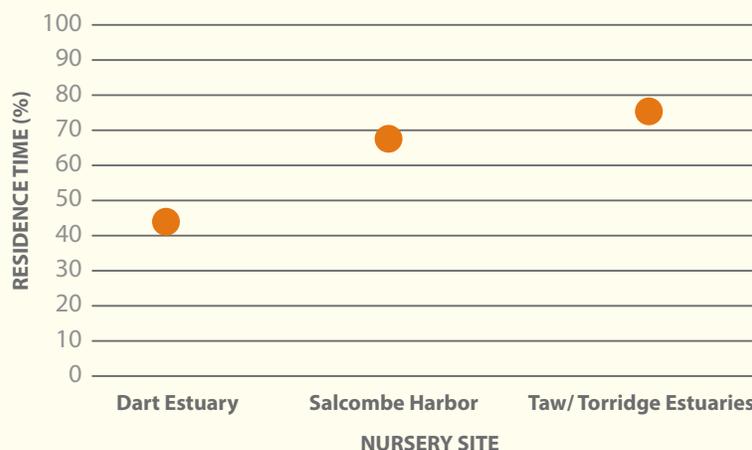
- 55% of fish stayed in their original nursery during the winter (Fig. 2).

We also found that residence time varied between nursery sites, but it was not related to fish size.

Figure 2:

The percentage of time fish spent close to their nursery site.

Which of the nursery sites had the lowest residence time?



Discussion

Our study showed that European bass generally like to stay close to coastal nursery sites. Even most fish that had long coastal movements tended to return to their original nursery. These patterns were not related to fish size. This means coastal nursery habitats are important for them at lots of different ages. It also means they are important year-round.

If we want to help fish populations, we need to protect these coastal nursery habitats. This might be hard. 85% of Europe's coastline is at risk for development. This could change environmental conditions in nursery habitats and harm fish.

One way to protect these areas is to label specific places as "Essential Fish Habitat" or "Fish Stock Recovery Areas".

These special titles define areas where fishing could be really harmful. Marine management organizations also use these labels. They design plans that protect habitats and prevent overfishing. With more protected areas, fish populations will likely increase.

Many other important fisheries are declining around the world. We need more information to protect them properly. We are expanding our research to look at other species like tuna, pollack and crawfish. Hopefully we can learn how they use coastal areas across the UK and France to help protect them.

Conclusion

Lots of people depend on fish for food. Fish are also important to the health of the ocean. You can help make sure their populations do not decline.

If you eat fish, make sure their population is stable. If you don't eat fish, you can still help by protecting coastal habitats. You can:

- Participate in beach cleanups.
- Get involved in local ocean protection organizations.
- Use less fertilizer in your yard and throw away your trash properly.
- Contact your government representatives to encourage good development practices along coastlines.

Glossary of Key Terms

Acoustic tag – A small electronic device that emits a sound that can be detected in water. Usually these sounds are emitted as pulses or "pings" that can be detected by a receiver. We can determine the 3D position of a fish using pings detected by multiple receivers.

Estuary – An area on the coast where freshwater rivers or streams meet and mix with the ocean. The water is generally salty, but not as salty as in the ocean.

Fishing pressure – The amount of fishing that happens in an area or for a specific type of fish. This can include both recreational and commercial fishing. It can also include using different fishing strategies. For example, using a single rod and reel would result in lower fishing pressure than dragging a net to catch fish.

Recruitment – The number of fish that survive and move on to the next life stage. This could mean the number of fish that are born and then grow to become juveniles, or the number of juveniles that survive to become part of the adult population.

Check your understanding

- 1 What are two factors that have contributed to the European bass population decreasing?
- 2 Besides coastal development, what are three other human impacts on the ocean?
- 3 Describe the pattern of fish movement we observed in this study over the course of the year.
- 4 Why might young fish want to stay in coastal habitats like the ones in this study?
- 5 Write a letter to a government representative about why and how they should help protect coastal areas. Use information from this article to help support your ideas. Write an outline below.

REFERENCES

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