Chapter 9
Conclusion: Looking Forward

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The case studies presented in this volume offer a compelling look at the damage caused to many forms of Underwater Cultural Heritage (UCH) by bottom trawling and other mobile fishing gear, as well as provide some suggestions to protect this vital Ocean Heritage resource for future generations. The authors from Stellwagen Bank National Marine Sanctuary (Chap. 6, this volume) highlight their new Sanctuary Mapping Initiative which works with fishers to 'to conduct side-scan sonar surveys to locate and document shipwrecks and characterise seafloor habitats'. It is a promising step forward and can help to show fishers in other waters the shared natural and cultural importance to shipwrecks and highlight the need for protection of seabed heritage.

Michael Brennan's work in Turkey indicates this is possible: his data shows 'curves to the west as fishers began veering away while they recovered their towed gear', indicating 'that the trawlers in this coastal area abided by local regulations' (Brennan, Chap. 4, this volume). A desire to reach this sort of compliance is sorely needed, as noted in Chap. 7, that focuses on trawling and fishing communities. The authors call for more effort 'to develop ways to balance the needs of fishers with preservation of nature and heritage' (this volume).

New technology allows this balance to be monitored in new ways. Brennan highlights throughout his work in this volume the potential use of AIS monitoring. AIS is carried by most vessels, so active trawlers can be monitored. This can 'provide the resources necessary to ensure that deep-water shipwrecks are no longer out of sight and out of mind' (Brennan, Chap. 4, this volume). Brennan argues for a type of EZPass (as used for tolls on the highways in the United States) to implement this. Geofences can be utilised to ensure that when a trawler crosses into, for example, areas of high numbers of shipwrecks or a vessel switches off its AIS, a fine is levied.

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What will be most beneficial in accomplishing these solutions is an increase in monitoring shipwrecks at risk from trawling and a greater pool of case studies to learn from. As noted by Majcher et al. in Chap. 5, 'advancements in geophysical techniques have afforded researchers unprecedented insights into the dynamics of underwater shipwreck sites'. Project ENDURE is working towards using new insights to increase the amount of data and analysis available for scientists to monitor shipwrecks at risk from bottom trawling. The archaeological data should also be considered alongside natural ocean science data, for example the Census of Marine Life,[1] to see the impacts on both. Trawling threatens not just UCH, but also natural resources in the ocean.

This damage from bottom trawling also feeds into another volume in this series, *Threats to Our Ocean Heritage: Potentially Polluting Wrecks* (2024). Here, editor Michael Brennan pulls together case studies that demonstrate the risks to Ocean Heritage from Potentially Polluting Wrecks (PPWs). In several cases, wrecks surveyed as PPWs have also showed evidence of bottom trawling impacts and it is possible that those impacts contributed to an oil leak (Brennan et al., 2023).

9.1 Maritime Heritage Ecology and Steps Forward

UCH can support ecological marine biodiversity and helps boost sea connectivity. Kirstin S. Meyer-Kaiser and Calvin H. Mires coined the term 'Maritime Heritage Ecology', a field that must be further explored (Meyer-Kaiser & Mires, 2022) and the importance of which is highlighted in Chap. 6. Cultural heritage and natural heritage are intertwined: UCH can support ecological marine biodiversity and help boost sea connectivity. Natali Pearson and Benjamin Thompson argue that it is beneficial for sites with high UCH and high natural heritage to co-occur and be used strategically together (Pearson & Thompson, 2023).

Finally, damage from bottom trawling provides a look into the potential future of our Ocean Heritage if effective regulations are not passed for Deep Seabed Mining (DSM). What we do with trawling can pave the way for other ocean exploration and exploitation (Jarvis, 2023). Additionally, while there are many unknowns in deep sea biodiversity and ecosystem services, what is already known clearly points to vast and far-reaching damage by humans. In other words, we know enough from existing trawling damage that tells us we should stop similar practices, like seabed mining, and look to regulate existing practices. Trawling is a clear and present threat not only to fish populations and habitats, but also to submerged cultural landscapes. There should not be a choice between humans and the natural world. Restrictions, such as the options outlined in this volume, must be passed as soon as possible to prevent further material and heritage destruction.

[1] http://www.coml.org/index.html

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