DELIVERABLE D4.3.3

Report on Pilot Action results

Project ID	10045781
Project acronym	Adri.SmArtFish
Project full title	Valorisation of SMall-scale ARTisanal FISHery of the Adriatic coasts, in a context of sustainability
WP4	Valorisation of Small-Scale Fishing and diversification of opportunities
Activity 4.3	Joint development and piloting of eco-innovative approaches
Partner in charge	PP1
Partners involved	PP6
Status	Final
Distribution	Public
Date	31/08/2021

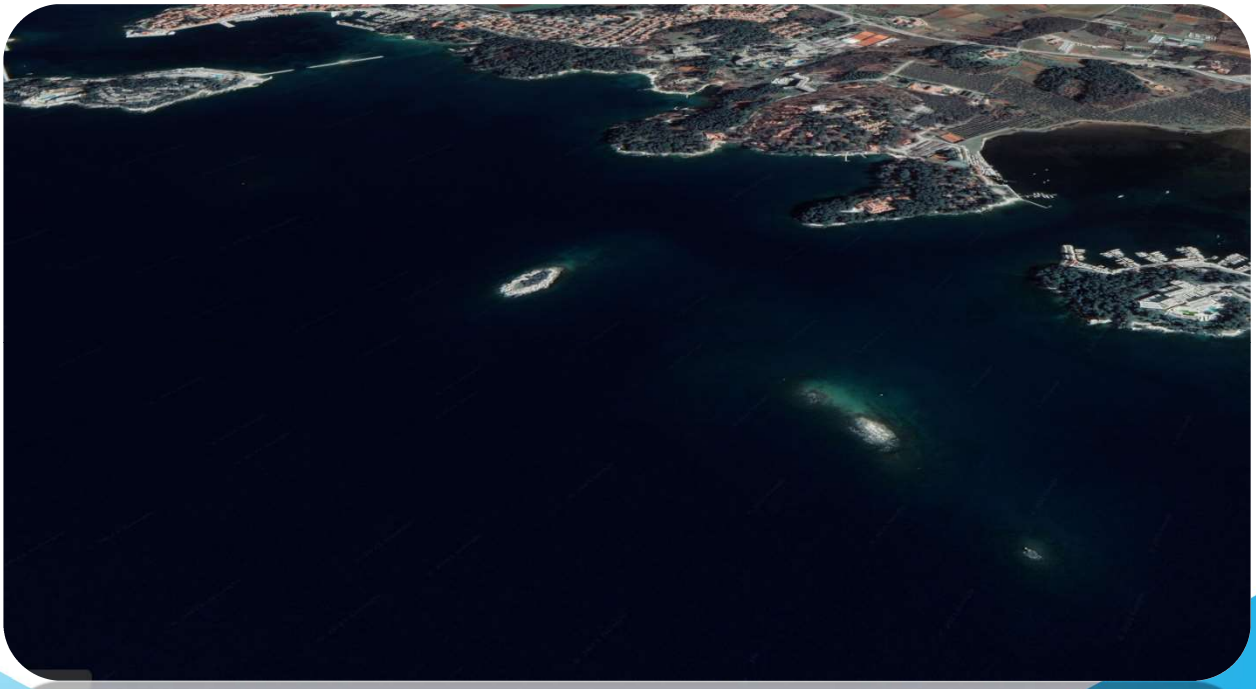
Interreg Italy - Croatia Adri.SmArtFish European Regional Development Fund

EUROPEAN UNION

Sveučilište u Rijeci, Pomorski fakultet
University of Rijeka, Faculty of Maritime Studies

MARITIME STUDY – Artificial reef installation as a part of Adri.SmArtFish project

SUMMARY



Rijeka, August 2021.

Title:	**MARITIME STUDY – Artificial reef installation as a part of Adri.SmArtFish project**
Client:	REGION OF ISTRIA M.B. Rašana 2/1 52 000 Pazin
Contractor:	FACULTY OF MARITIME STUDIES University of Rijeka Studentska 2, 51000, Rijeka
Experts:	Lovro Maglić, Ph.D. Vlado Frančić, Ph.D.

Maritime study reflects the author's views; the Programme authorities are not liable for any use that may be made of the information contained therein.

Contents:

1 INTRODUCTION

This summary contains the essential parts of the *Maritime study - Artificial reef installation as a part of Adri.SmArtFish project.* The Maritime study is based on a contract between the Region of Istria and the Faculty of Maritime Studies signed on the 25th of August 2021.

The aim of the study is to propose a set of maritime safety measures, conditions of navigation, as well as pollution protection and emergency measures in the area of the future artificial reef. The study includes an analysis of meteorological, hydrological and navigational features of the area, technical and technological features of vessels and the impact of maritime traffic in the vicinity. For detailed explanations, see the full text of the Maritime study.

Consideration of proposed measures are based on the following assumptions:

- the artificial reef is planned to be placed in the vicinity of the Žontuja islet in the area of the city of Poreč, following the delivered Basic design,
- the purpose of artificial reef installation is to use it for studying the settlement of underwater flora and fauna,
- maritime safety measures have been developed and proposed considering the existing maritime traffic in the area.

The study is based on available data sources as appropriate for the preparation of maritime studies. When choosing data, preference is given to data available from sources of greater reliability. In particular, the study shall draw data and conclusions, as appropriate, from the following documents:

- Basic design - Artificial reef in the area of the city of Poreč - Pontifex, Pula, May 2021.
- Maritime Study - Safety of navigation and pollution prevention at the artificial reef in the sea area of Zadar county, August 2020.
- Traffic and Navigation Study - Study of consolidation of the mandatory ship reporting system and establishment of a joint Adriatic VTS system, Faculty of Maritime Studies, Rijeka, 2016.
- Maritime Study - Analysis and evaluation of the suitability of the base design of the port of Antenal from a maritime point of view, Faculty of Maritime Studies, Rijeka, 2012.

The maritime study was written following common maritime safety standards and recent scientific knowledge. Consequently, the conclusions, findings and opinions in the study were presented impartially following the available scientific and professional knowledge and generally accepted rules.

This maritime study may not, in whole or in part, other than expressions and parts which are generally accepted, be used, officially or unofficially, without the permission of the authors. The Maritime study belongs to the Client (Region of Istria) and is the property of the Client.

2 METEOROLOGICAL AND HYDROLOGICAL FEATURES OF THE AREA

NE (Bura) and SE (Jugo) winds are the most common winds in the observed area. These winds can reach storm strength during which ships navigating the wider area of the western coast of Istria may be significantly affected. The impact of strong wind gusts can be significant for ships with a large windage area (the surface above the waterline) including smaller passenger vessels and nautical tourism vessels (yachts) with a large windage area relative to the vessel's draft.

However, considering all winds and their frequency the most common winds are of the power between 1 and 3 Bf (76.7% for Rovinj and 93.3% for Novigrad). Therefore, in most cases during the year the wind will not significantly affect the safety of navigation in the area.

In the observed area, the NE wind generates short waves with relatively low amplitude. It can be considered that NE wind waves do not significantly affect the safety of navigation in the observed coastal area. On the other hand, the greatest lengths and heights are reached by waves during the long and stormy SE wind. Due to the long leeward on the high seas, it can cause waves above 5 meters.

According to the data of the Croatian Hydrographic Institute for the area of the western coast of Istria, for the port of Rovinj, tides are medium-sized of 0.5 to 0.7 m. However, tides will not affect the safety of vessels during the use of the artificial reef.

Considering the whole Adriatic Sea, fog is most common on the west coast of Istria (10 to 20 days a year), especially during the winter months. However, given the rare occurrence of fog (according to yearly statistics) and extremely local occurrence, it does not have a significant impact on the safety of navigation.

Although the speed of the sea current in the western part of Istria is generally not higher than 0.8 knots, it should be emphasized that in the southern part of Istria it can be significantly higher. During stormy SE winds, the sea current speed in the wider area can be up to 2 knots. In general, sea currents in the navigable area of the artificial reef will not have a significant impact on the navigation in the vicinity or the exploitation of the reef.

3 NAVIGATIONAL AND MARITIME TRAFFIC FEATURES OF THE AREA

The navigational area under consideration is located in the area of western Istria in the waters near the port of Poreč, near the islet of Žontuja. The artificial reef in question is intended to be installed at a distance of approximately 350 meters NW of the islet of Žontuja.

The main waterway in this coastal navigation area is parallel to the direction of the coast, laid in the direction NNW-SSE at a distance of one to three nautical miles from the coastal edge. The main waterway is situated outside the coastal islands. This waterway is mostly used by vessels sailing between various ports in the northern and southern parts of western Istria.

The important nearby approach waterways are approaches to the port of Poreč and the northern and southern approach to the Parentium marina, which are located between the mainland and the coastal islands (Regatta, Žontujić, Žontuja, Butaceja, Altiježand Orada).

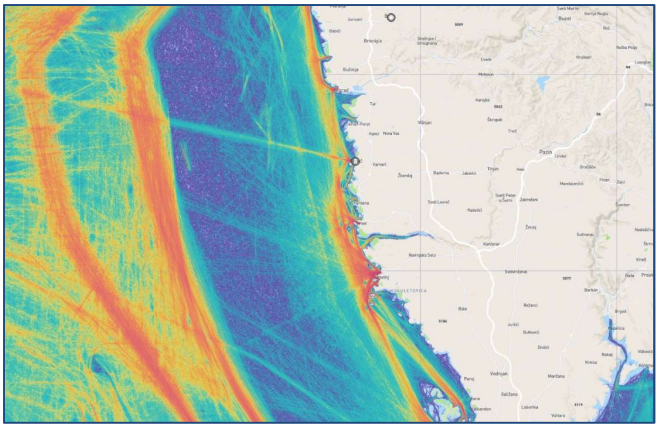


Figure 1 Open sea and coastal waterways

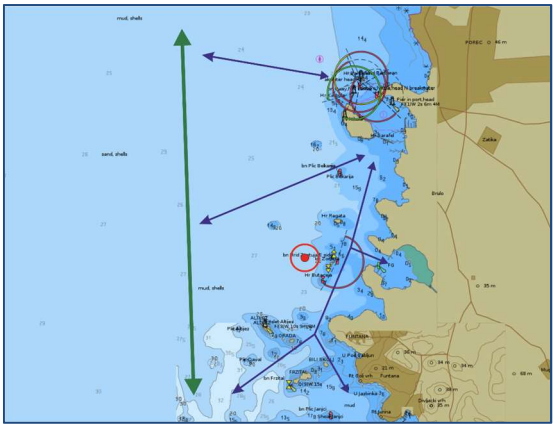


Figure 2 Main and approaching coastal waterways

The observed area near the planned position of the artificial reef is assessed as sufficiently equipped with navigational aids (buoys, markers and navigational lights).

There are no navigational hazards, shoals, installed submarine pipelines or cables in the nearby area of the planned artificial reef position.

The majority of maritime traffic in the wider observed area takes place during the summer months and refers to passenger ships (smaller cruisers and excursion ships), high-speed passenger vessels and boats and yachts in nautical tourism. During the winter months, the traffic consists primarily of fishing boats and boats of the domicile population.

4 TECHNICAL FEATURES OF THE REEF

The artificial reef is intended to be installed at the geographical position φ = 45° 12' 24.5" N and λ = 013° 34' 33.3" E. The planned position is located at a distance of approximately 350 m NW from the islet of Žontuja, in the direction of the open sea.

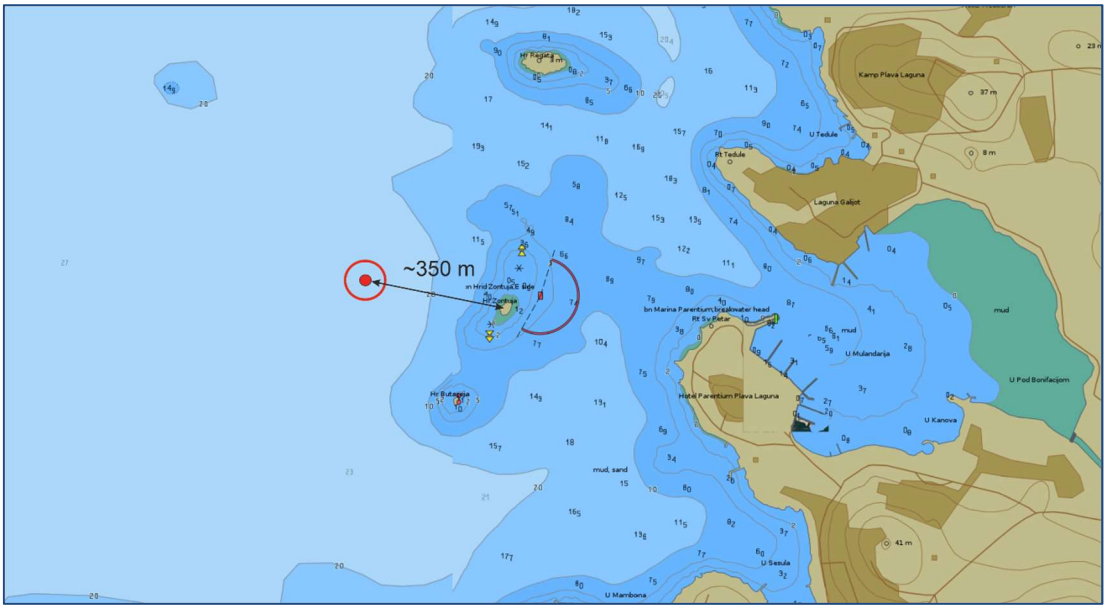


Figure 3 Planned position of the artificial reef (red circle)

A minor deviation from the intended position may occur to select the most suitable place considering the actual morphology of the seabed and to preserve the existing biocenosis at the site.

The artificial reef will be prefabricated, and will form a body composed of a total of 240 concrete elements (164 basic elements and 76 pipes). The final dimension of the assembled reef will be 13.00 x 6.55 (5.45) x 2.32 m. The total mass of the reef will be 76.14 t.

The concrete basic element particulars are:

- Length = 1,13 m
- Width = 0,45 m
- Height = 0,51 m
- Openings 1 x φ 0,1 m, 2 x φ 0,05 m
- Number = 164 pcs
- Weight = 360 kg/pc

The concrete pipe particulars are:

- Length = 1,00 m
- Outer diameter = 0,605 m
- Inner diameter = 0,500 m
- Perforation opening min. = 0,05 m
- Number = 76 pcs
- Weight = 225 kg/pc

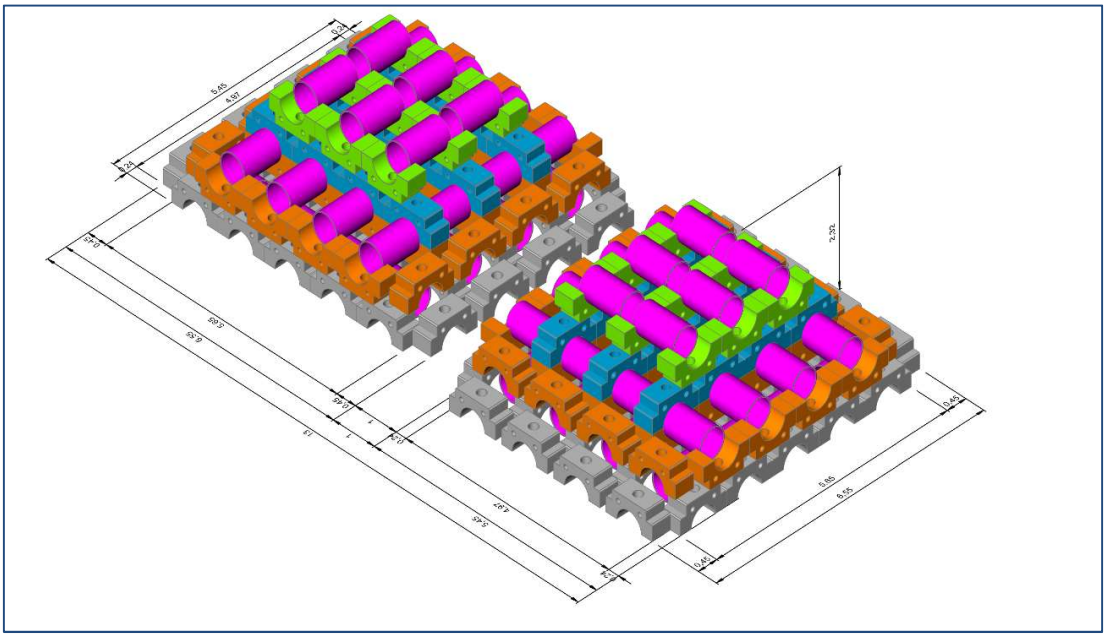


Figure 4 Axonometric projections of the artificial reef

The depth of the sea at the proposed location is approximately 25.6 m. According to the available data, the seabed at the site is composed of mud and sand.

The height of the reef above the seabed would be 2.32 m, i.e. the depth of the sea above the top of the reef would be approximately 23.2 m.

The artificial reef shall be under the jurisdiction of the Region of Istria, i.e. the Region of Istria shall assume the responsibility for the use of the reef.

5 MARITIME SAFETY MEASURES

The sea depth of 25,6 meters, at which the artificial reef will be placed, does not represent a restriction or danger for the safety of navigation for vessels that sail in the wider coastal area.

Before the installation of the reef, it is necessary to:

- inform the Harbormaster's office Pula about the plan and course of activities (works) at sea, including delivery (towing) and installation (submersion) of the artificial reef. All activities at sea must be announced through the official Notice to mariners.
- appoint a responsible person for works with contact information (telephone and e-mail) and submit the information to the Harbormaster's office Pula.

After the installation of the artificial reef, it is necessary to:

- carry out an official bathymetric survey at the location of the artificial reef and update nautical charts.
- draw the position of the artificial reef on nautical charts (mark K15 - *Underwater reef of known depth, not dangerous for surface navigation*) and enter the name and the new measured depth.

It is proposed to enter information on the newly installed artificial reef in the nautical publication *Adriatic Sea Pilot* with the following text: Underwater artificial reef measuring 13.00 x 6.55 x 2.32 m is set at a depth of 25 meters on the geographical position φ = 45° 12' 24.5" N and λ = 013° 34' 33.3" E.

It is proposed to mark the underwater reef with a brightly coloured buoy of smaller dimensions as shown in the study.

The Harbormaster's office Pula will make the final decision on the necessary marking of the artificial reef and additional navigation safety measures.

6 ENVIRONMENTAL PROTECTION AND EMERGENCY MEASURES

Pollution from vessels may be divided into pollution resulting from regular work (work pollution) or accidents. In general, the main cause of pollution may be accidents during the navigation of the vessels or their stay (moored or anchored) at the position of the artificial reef, caused by spills of fuel or oily water.

The main pollution protection measures include closing all deck openings on the ship/boat and keeping regular maintenance of the vessels.

In the case of pollution from a vessel the master or the person operating the vessel is responsible to:

- take measures to prevent further discharges of liquids into the sea,
- remove any source of potential ignition,
- organize the cleaning of the deck and removing oily or greasy materials as soon as possible,
- inform the Harbormaster's office Pula about the pollution and potential causes, the amount and source of the substance released into the sea, its properties and the measures taken,
- follow the instructions received from the Harbormaster's office Pula.

Emergencies are considered to be adverse weather conditions, i.e. heavy storm, fire or explosion, flooding and sinking of the vessel, any failure of the machinery, pollution of the sea or injury to a person on board.

The basic measure in the event of a fire and/or explosion on a vessel is to extinguish the fire with the available fire-fighting equipment on-board. It should be emphasized that vessels that can be expected on an artificial reef usually do not have high capability of fire-fighting equipment, so in case of major fires, it is crucial to timely inform the competent persons of the Harbormaster's office Pula and vessels in the vicinity.

In all other cases of emergency, the master or the person operating the vessel must act following the measures specified in the study and inform the competent persons of the Harbormaster's office Pula as soon as possible and ensure further action according to the received instructions.