1160 Large shallow inlets and bays

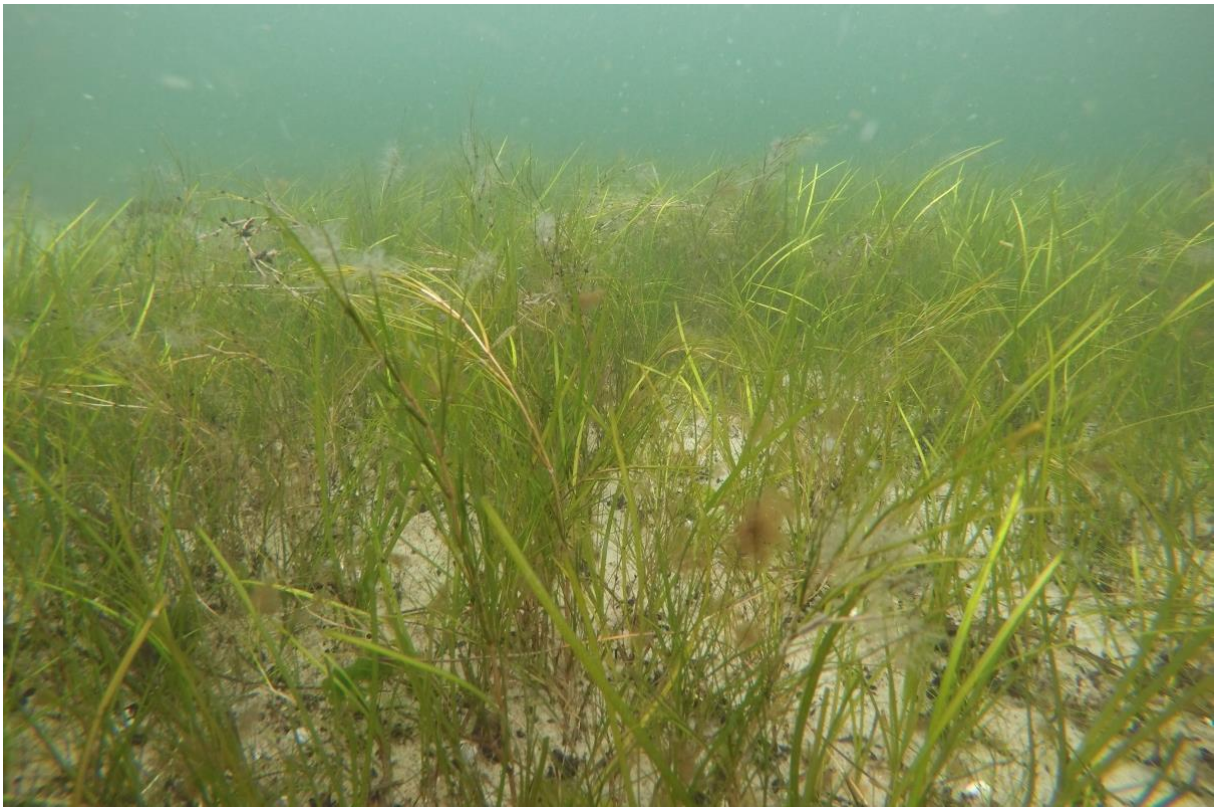

Photo. 1. Sea grass meadows in the Puck Lagoon (photo T. Krypczyk)

I. DESCRIPTION OF THE HABITAT

Habitat *Large, shallow inlets and bays* (1160) is defined as „an indentations of the coast, sheltered from wave action and being under minor influence of freshwaters, characterized by high diversity of flora and fauna communities" (Warzocha 2004).

In the Polish marine areas, only the Puck Lagoon with part of the Outer Puck Bay limited to 20 m isobath with a total area of 21990.1 ha, can be considered as habitat 1160 (site central point 18°35,442'E 54°41,100'N). The site is situated within boundaries of Natura 2000 area – Puck Bay and Hel Peninsula PLH220032 (SDF for PLH220032). An important role for the preservation of the habitat 1160 plays its ecotone zone – in this case the coastal area 50 m wide (Michałek and Kruk-Dowgiałło 2014, Michałek and Kruk-Dowgiałło 2016).

Generally, both basins, the Puck Lagoon and the Outer Puck Bay, are characterized by significant diversity in terms of depth, water exchange and morphology of the bottom. The Outer Puck Bay is deeper and direct connected with the Gulf of Gdańsk. Its bottom is not diverse and its depth decreases eastward. The Puck Lagoon is shallower basin with an average depth of 3 m and more diverse bottom morphology with many depressions and hollows. The boundary between those two water bodies is formed by a natural, sandy embankment called Rybitwia Shallow, which is an integral

part of the habitat. It is 8.6 km long and remains above water surface for half a year. It borders with Rewa Cape at the south side. Both objects have changeable surface areas dependent on the sea level. They are separated from each other by Głębinka Strait (8.1 m wide) (Michałek and Kruk-Dowgiałło 2014).

Habitat 1160 is unique in terms of natural values, mainly because of sea grass meadows and high diversity of water plants. Except large number of protected species, numerous rare species of green algae, charophytes, brown algae, red algae and vascular plants occur in this area. In the Puck Bay, protected species of charophytes are noted, e.g. *Chara baltica*, *Tolypella nidifica* and *Nitella capilaris* (Regulation of the Minister of Environment on 9 Oct 2014 about the protection of plant species, Journal of Laws 2014 pos. 1409) and vascular plants forming vast *mono-species* and *multi-species* underwater meadows (Kruk-Dowgiałło 2000, Kruk-Dowgiałło and Szaniawska 2008, Ecosystem approach… 2004-2009, Kruk-Dowgiałło and Brzeska 2009, Osowiecki et al. 2009 a, Michałek and Kruk-Dowgiałło 2014, SEM 2008-2015). The most valuable and most endangered component of the underwater meadows is sea grass *Zostera marina*, which is strictly protected. Significant areas of the sandy bottom are overgrown with meadows of *Zannichellia palustris* and *Potamogeton pectinatus*. Meadows are occupied by diverse fauna species, e.g.: *Hydrobia* sp., *Cerastoderma glaucum*, *Macoma balthica*, *Marenzelleria neglecta* and phytophylous fauna (Osowiecki et al. 2009).

Ichthyofauna of this habitat is represented by freshwater (roach, pike, perch), diadromous (brown trout, European whitefish) and seawater species (broad-nosed pipefish, straightnose pipefish). A characteristic feature of the habitat is reed, which stabilize the coast and serves as a potential spawning ground for phytophylous fish and a shelter for avifauna. It is also a natural buffer removing pollutants from land. Natural reed beds are composed of *Bolboschoenus maritimus*, *Schoenoplectus tabernaemontani* and *Phragmites australis* (Michałek and Kruk-Dowgiałło 2014, Michałek and Kruk-Dowgiałło 2016).

The state of the Puck Lagoon and the outer Puck Bay has deteriorated significantly since the mid-1970s due to too many long-term runoff of biogenic substances from the land (Kruk-Dowgiałło and Szaniawska 2008). These water bodies have been the most frequently studied water area in Polish Maritime Areas.

II. METHODS

1. Assessment of the conservation status of the habitat as well as indices of specific structure and functions

In the table (Table 1) there is a description of parameters and indices to assess the conservation status of the habitat *Large, shallow inlets and bays* (1160), while the table (Table 2) presents the valorisation of these parameters and indicators. The figure (Fig. 1) presents the method of aggregating assessment of indices and parameters to assess the conservation status of this habitat.

Table 1. Description of parameters and indicators of the habitat Large, shallow inlets and bays (1160)

Parameter/Indicator	Description of parameter or indicator
Area	Expert assessment that takes into account anthropogenic changes in the ecotone zone of the habitat (50 m), including fragmentation of the sea coast.
Specific structures and functions	
Ecological status according to Water Framework Directive	Assessment of ecological status of waters in accordance with the applicable order of the Minister of the Environment regarding the method of classification of the state of surface water bodies, performed as part of the State

Parameter/Indicator	Description of parameter or indicator
	Environmental Monitoring.
Anthropogenic pressure in the coastal zone	Indicator based on the percentage share of the total length of anthropogenically transformed coast to the total length of the coast within habitat. Indicator takes into account anthropogenic changes of the sea coast by the constructions: coastal defences, buildings, roads, parking, etc. in a 50 m wide strip from the water line.
Reed community	Indicator based on the ratio of the length of the coastal zone cover with reed to the length of the whole coastal zone within habitat.
Area and state of the sandbanks	Indicator based on assessment of the anthropogenic pressure on the sandbank periodically exposed above the surface of the water.
Salinity [PSU]	Natural salinity of the habitat water.
Typical species of ichthyofauna	Indicator based on presence: 1. typical species of fish: straightnose pipefish, broad-nosed pipefish, sand goby, 2. adult (ADULT) and juvenile (JUV) individuals of viable populations of some typical fish species: roach, pike, perch, european whitefish, brown trout (including stocking of these species of fish within habitat).
Typical taxa of macrophytes	Indicator based on presence typical taxa for habitat: *Zostera marina*, *Zannichellia palustris*, *Chara* spp., *Potamogeton* spp.
Typical taxa of macrozoobenthos	Indicator based on presence typical taxa for habitat: *Hydrobia* sp., *Cerastoderma glaucum*, *Limecola balthica*, *Gammarus* sp., *Idotea* sp., *Jaera* sp.
Non-indigenous species	Indicator based on the number of new NIS in habitat in the period of assessment in relations to the reference list.
Conservation prospects	Future prospects of conservation status in the next 10-15 years. This expert assessment determines current population status of characteristic species, habitat status, observed processes and their intensity as well as other impacts and the potential future threats to the habitat at sampling station. Therefore, besides of the monitoring surveys and specific indicators it is recommended to gather the information about future impacts on the habitat, method of the site protection and conservation measures.

Table 2. Valorization of parameters and indicators with components of the habitat Large, shallow inlets and bays (1160)

Parameter/Indicator	Assessment		
	FV favourable status	**U1** unfavourable inadequate status	**U2** unfavourable bad status
Area	Habitat area is not reduced and is not anthropogenically fragmented	Habitat area slowly decreased compared to earlier survey or to literature references or it is anthropogenically fragmented	Habitat area fast decreased compared to earlier survey or to literature references or it is highly anthropogenically fragmented
Specific structures and functions			
Ecological status according to Water Framework Directive	Valorisation is presented in the table 3		

Parameter/Indicator	Assessment		
	FV favourable status	**U1** unfavourable inadequate status	**U2** unfavourable bad status
Anthropogenic pressure in the coastal zone	If length of natural coast changed less than 20% of the whole length of coast line	If length of natural coast changed in the range of 20-40% of the whole length of coast line	If length of natural coast changed over than 40% of the whole length of coast line
Reed community	If the reed community in the coastal zone covers over 23% of the whole coastal zone	If the reed community in the coastal zone covers 23-20,5% of the whole coastal zone	If the reed community in the coastal zone covers less than 20,5% of the whole coastal zone
Salinity	If the salinity is in the range of 5,5 – 8,7	If the salinity is in the range of 3,0 – 5,4 or 8,8 – 11,2	If the salinity is in the range of 0,0 – 2,9 or above 11,2
Area and state of the sandbank	If sandbank is not exposed to anthropogenic factors (mainly investment activities permanently transforming the bottom, trampling, overuse) and changes in the surface are only natural	If sandbank is incidentally exposed to anthropogenic factors (mainly investment activities permanently transforming the bottom, trampling, overuse), but they do not cause permanent changes (including area)	If sandbank is exposed to anthropogenic factors (mainly investment activities permanently transforming the bottom, trampling, overuse) which caused permanent changes including changes of the area
Typical species of ichthyofauna	All typical species are presented: straightnose pipefish, broad-nosed pipefish, sand goby, common goby and adult (ADULT) and juvenile (JUV) individuals of roach, pike, perch, european whitefish, brown trout; in the period of the assessment stocking of these species is not carried out	3 typical species of the following fish are presented: straightnose pipefish, broad-nosed pipefish, sand goby, common goby and/or adult (ADULT) or juvenile (JUV) individuals of roach, pike, perch, european whitefish, brown trout; besides in the period of the assessment stocking of one of these species is carried out	2 or 1 typical species of the following fish are presented: straightnose pipefish, broad-nosed pipefish, sand goby, common goby and/or none of ADULT or JUV stages of at least one of the following species: roach, pike, perch, european whitefish, brown trout
Typical taxa of macrophytes	If 4 taxa from the list of typical taxa are presented	If 3 taxa from the list of typical taxa are presented	If 2 or 1 or none taxa from the list of typical taxa are presented
Typical taxa of macrozoobenthos	If 5 or 6 taxa from the list of typical taxa are presented	If 3 or 4 taxa from the list of typical taxa are presented	If 2 or 1 taxa from the list of typical taxa are presented
Non-indigenous species	None of new NIS will appear	If 1 new NIS will appear	If at least 2 new NIS will appear
Conservation prospects	Conservation prospects for the habitat are good or excellent, no significant impact of	Conservation prospects of the habitat are poor. Impacts of threatening factors are expected.	Conservation prospects of the habitat are bad. There are significant impacts of threatening

Parameter/Indicator	Assessment		
	FV favourable status	**U1** unfavourable inadequate status	**U2** unfavourable bad status
	threatening factors predicted, survival of the habitat in the perspective of 10–15 is very probable.		factors. The survival of the habitat in the perspective of 10–15 years can not be guaranteed.

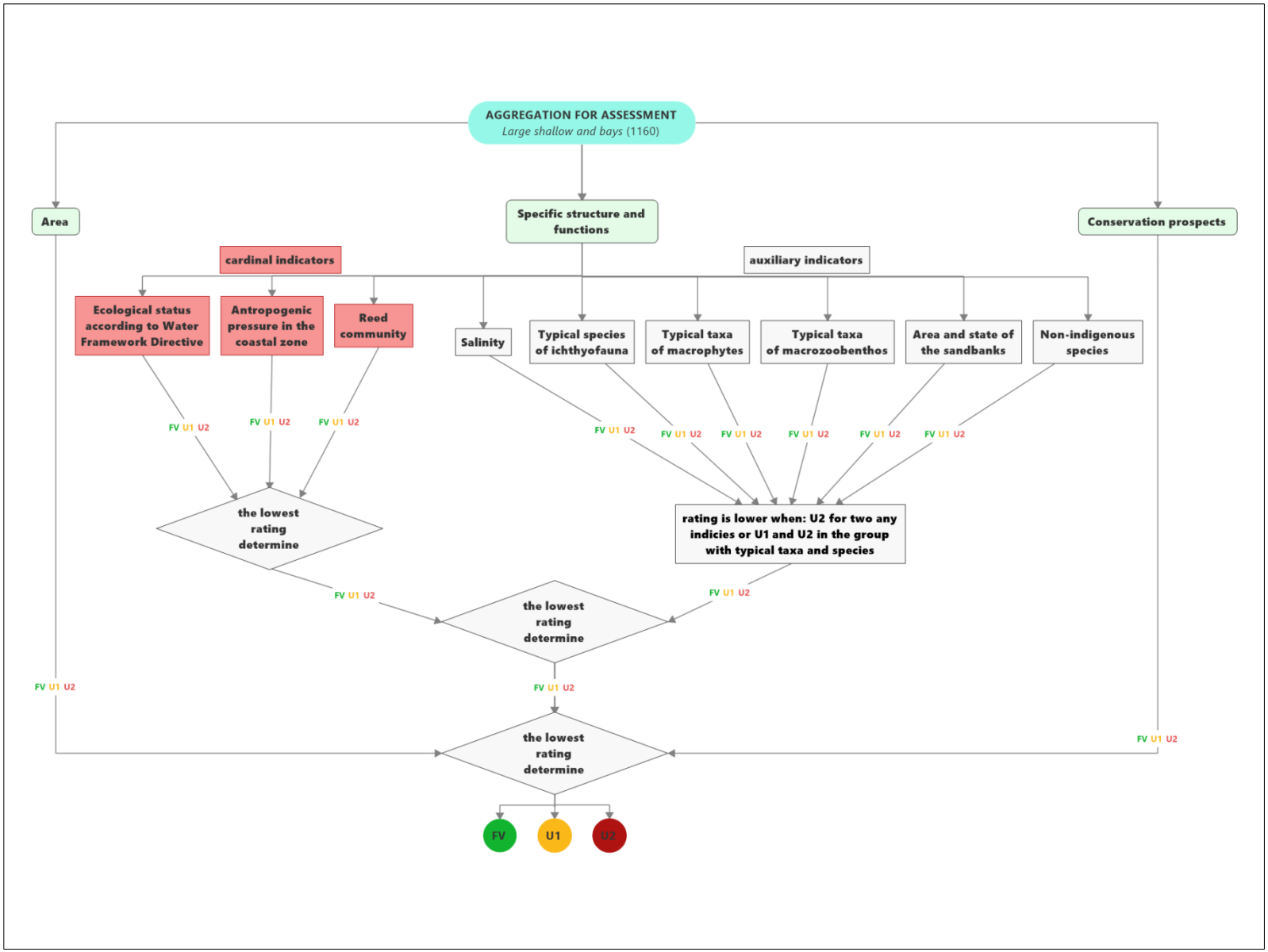

Fig. 1. Diagram of aggregation of indicators and parameters to assess the state of protection of the habitat Large, shallow inlets and bays (1160)

2. Methodology of monitoring studies

2.1 Selection of monitoring locations

A monitoring site is understood as the area of the habitat within its natural borders, within which research stations are located, on which samples for research are collected.

The monitoring should comprise the only one site of occurrence of this habitat in Poland, that is the Puck Lagoon and the Outer Puck Bay within the area of Puck Bay and Hel Peninsula (PLH220032) (**Błąd! Nie można odnaleźć źródła odwołania.**).

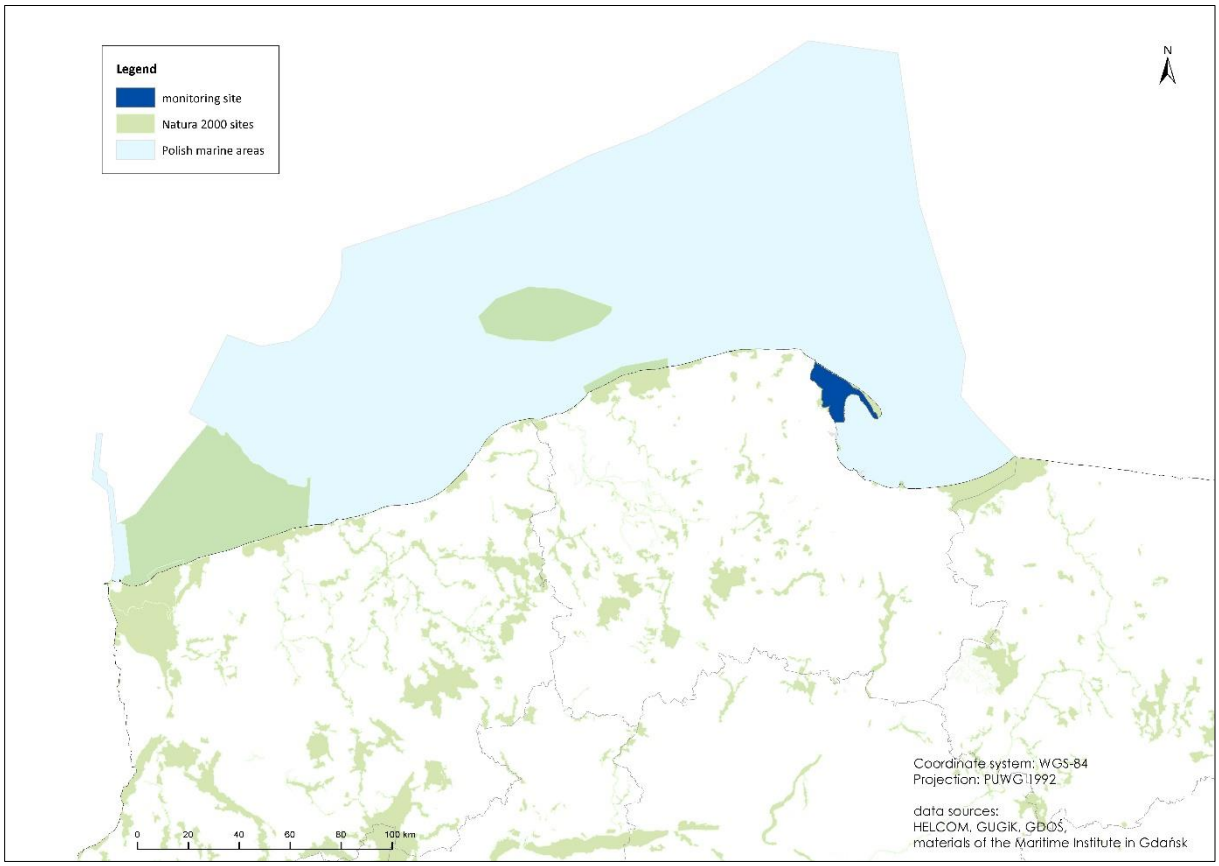

Fig. 2. Site for monitoring habitat Large, shallow inlets and bays (1160)

2.2 Study methods

Ecological status according to Water Framework Directive

The assessment of the indicator should be conducted according to the result of the assessment of the ecological status of transitional and coastal waters performed by Province Environment Protection Inspectorate in Gdańsk, based on SEM data collected for both surface water bodies, that is the Puck Lagoon and the Outer Puck Bay.

The interdependence of the classification of the status according to the Water Framework Directive and the assessment of the conservation status according to the Habitats Directive with the method of assessment aggregation of both water bodies and the resulting valorisation is presented in the table (Table 3).

Table 3. The interdependence of the classification of the status according to the Water Framework Directive and the assessment of the conservation status according to the Habitats Directive with the method of assessment aggregation of both water bodies and the resulting valorisation of indicator 'Ecological status according to the Water Framework Directive'

Puck Lagoon (PLTWIIWB2)			**Outer Puck Bay (PLTWIIIWB3)**			***Large, shallow inlets and bays* (1160)**		
Assessment of the environmental status according to the Water Framework Directive								
very good / **good**	**moderate**	**poor** / **bad**	**very good** / **good**	**moderate**	**poor** / **bad**			
Assessment of the conservation status according to the Habitats Directive								
FV	**U1**	**U2**	**FV**	**U1**	**U2**	**FV**	**U1**	**U2**
X			X			X		
X				X		X		
X					X		X	
	X		X				X	
	X			X			X	
	X				X		X	
		X	X				X	
		X		X				X
		X			X			X

The assessment of the indices: 'Anthropogenic pressure in the coastal zone', 'Reed community' and 'Area and state of the sandbanks' can be carried out on the basis of aerial photographs (with georeference) made in the period from June to September. These photographs should be made along the entire coastal zone within the habitat boundaries and should include the area of Rybitwia Shallow.

Anthropogenic pressure in the coastal zone

Field survey should be preceded by the analysis of the ortophotomap before monitoring. Besides, information on changes in the country development in the vicinity of the coast should be collected, among others from the Maritime Office in Gdynia. This office performs sea coast monitoring according to the *Sea Coast Protection Program* (Journal of Laws 2016, item 678), covering in most cases a 500 m wide land strip from the water line.

Field survey consists in an inventory of the current state of the coastal zone, including anthropogenic objects and urban development near the coast reaching up to 50 m inland. The satellite navigation system (GPS) should be used to mark the locations of coastal defences and other objects. The information obtained during the research should include the coordinates of the starting and ending point of the section occupied by the object or land development method. Every objects should be marked in accordance with the descriptions indicated in the tables (Table 4 – Table 6).

Objects less than 2 m in width should be marked as a point object with a coordinate determined in the middle of its width. For closed areas, coordinates of points should be obtained from an ortophotomap. The ortophotomap analysis should also be used to verify and supplement data obtained during field survey.

Beach width measurement should be performed using a measuring tape to determine the status of the coastal zone in the vicinity of anthropogenic objects. The erosion or accumulation at border and characteristic points should be evaluated by an expert method.

Additionally, photographic documentation should be prepared at the measurement points and between them.

Table 4. List of symbols of objects

Symbol	Object
nk	rip-rap (crushed stones)
mż	reinforced concrete wall
moż	reinforced concrete retaining wall
mog	gabions retaining wall
ś	sheet pile wall
o	slope revetment
p	palisade
po	palisade with slope revetment above
pnk	palisade with rip-rap foot
opm	sea wall of composite structure
pj	single or multi-row palisade
gk	stone causeway
km	composite structure
nsz	bank - artificial nourishment effect
wpp	embankment (longshore, soil core)
ws	shipwreck
nb	quay
prz	landing stage
ma	marine
pom	stage
mo	pier/jetty
kł	mattress, footbridge
pirs	pier
m	bridge
r	outlet pipe
ur	drainage ditch outtake
fu	detached breakwater

Table 5. List of symbols of erosion or accumulation effect

Symbol	Erosion or accumulation effect
l	lagoon
wb	coastal berm

Symbol	Erosion or accumulation effect
ps	wide beach
psk	undercutting cliff toe
ppw	undercutting dune toe
os	landslide
ob	rock fall
osy	avalanche
pw	narrow beach

Table 6. List of symbols for development in the vicinity of the coastal zone

Symbol	Development in the vicinity of the coastal zone
zz	dense urban development
bp	single buildings
tprz	industrial area
tp	harbour area
ps	parking area
c	camping place (campsite)
s	stadium, playing field
pz	playground, recreation place
l	helicopter landing pad
pu	farmlands
os	garden, orchard
p	park
o	area for development
tw	military area
sr	bicycle path
du	paved road
dg	dirt road/field road/forest road
tk	railway (track)
zs	temporary development

Reed community

Determining the occurrence of reed community on the shoreline consists in identifying all areas of its occurrence in the land-sea contact zone within the habitat. Sections of the coast with reed community should be marked using geographical coordinates of the beginning and end of this area. The identification can be made directly in the field or on the basis of aerial photographs (with georeferences).

Salinity

The assessment of salinity is determined based on data of the State Environmental Monitoring from coast posts (Hel, Gdynia and Puck. The average annual salinity values should be obtained on the basis of data collected within the State Hydrological and Meteorological Service through the Chief Inspectorate of Environmental Protection.

Area and state of the sandbank

The expert assessment of the state of sandbanks should be made on the basis of analysed aerial photographs and during field survey of other parameters of the 1160 habitat as part of the Monitoring of Species and Sea Habitats.

The long-term variability of the sandbank's surface is mainly caused by changes in formation due to strong storms. The assessment should therefore take into account changes in the sandbanks as a result of human activity (investment activities implemented in the Puck Bay area that may affect this element of habitat 1160, trampling, overuse).

Typical species of ichthyofauna

Assessment of the occurrence of typical species of ichthyofauna species should be made on the basis of field studies as well as data and information obtained from other sources.

Field survey for catching straightnose pipefish, broad-nosed pipefish, sand goby and common goby should be carried out with a beach seine with a closing panel section mesh sized of 5 mm and with the wings spread of 4 m. The manual trawl was done for 100 m in the water along the shore at depth up to 1 m.

However, data from the State Environmental Monitoring according to the Water Framework Directive is necessary to confirm the presence of fish species (roach, pike, perch, european whitefish and brown trout) that are semireproducting population. The data should be obtained from the database of the Chief Inspectorate of Environmental Protection from catches at stations: ZP1 Ryf Mew, ZP2 Kuźnica, ZP3 Błądzikowo, ZPZ1 Hel, ZPZ2 Jastarnia and ZPZ3 Mechelinki. This data are conducted in the summer season by Nordic survey net.

Data obtained from the Regional Maritime Fisheries Inspectorate in Gdynia concerning stocking of these fish species within habitat should be analysed in the assessment period.

Typical taxa of macrophytes

Occurrence of typical taxa of macrophytes should be assessed on the basis of field studies.

Macrophytes samples should be collected by a diver at four stations (36R, 19KII, 3F i T12) in June. Five samples should be collected at each station, among them: four quantitative samples using the DAK frame (Andrulewicz et al. 2004) and one qualitative sample of macroscopically different taxa. The film or photographic documentation should be made during the collection of samples and the transparency should be measured with the Secchi disc.

Macrophytes samples should be analysed in the laboratory in terms of taxonomic composition in accordance with the methodological guide for macrophytes research (Kruk-Dowgiałło et al. 2010). The names of identified taxa should be provided in accordance with the current nomenclature of the World Registry of Marine Species (WORMS).

Typical taxa of macrozoobenthos

Occurrence of typical taxa of macrozoobenthos should be assessed on the basis of field studies or data obtained from other sources.

Samples of macrozoobenthos (phytophillous fauna) should be collected by selecting animal organisms from quantitative samples dedicated to typical macrophytes taxa.

Samples of macrozoobenthos should be analysed in the laboratory in terms of taxonomic composition in accordance with the methodological guide for macrozoobenthos research (Osowiecki and Błeńska 2010). The names of identified taxa should be provided in accordance with the current nomenclature of the World Registry of Marine Species (WORMS).

The assessment should also take into account the results of the macrozoobenthos performed within the State Environmental Monitoring at ZP6 station. This data should be obtained from the database of the Chief Inspectorate of Environmental Protection.

Non-indigenous species

Literature and the State Environmental Monitoring data should be reviewed as a part of the work to identify the introduction of new non-indigenous species in the habitat during the assessment period. Species indicated in the table (Table 7) are a reference list that should be referred to in the future reporting cycles.

Table 7. List of non-indigenous species recorded in the Polish Sea Areas, status from 2018 (Michałek and Kruk-Dowgiałło 2014, Opioła et al. 2018)

No.	Taxon	Location of occurrence	Species recorded in the habitat ***Large, shallow inlets and bays*** **(1160)**
1.	*Alexandrium ostenfeldii*	Puck Lagoon	YES
2.	*Chaetoceros cf. lorenzianus*	southern Baltic sea	YES
3.	*Prorocentrum minimum (cordatum)*	Gdańsk Bay, open water of Bornholm Basin, Puck Bay	YES
4.	*Pseudochattonella farcimen*	Gdańsk Bay	-
5.	*Elodea canadensis*	Puck Bay, Vistula Lagoon, Szczecin Lagoon	YES
6.	*Acartia tonsa*	whole southern Baltic Sea	YES
7.	*Cercopagis pengoi*	Baltic Proper, Gdańsk bay, Puck Lagoon, Vistula Lagoon, Szczecin Lagoon, open water of Bornholm Basin	YES
8.	*Mnemiopsis leidyi*	Puck Lagoon , western part of Gdańsk Bay	YES
9.	*Evadne anonyx*	Gdańsk Bay, Puck Bay	YES
10.	*Anguillicola crassus*	Vistula Lagoon, Szczecin Lagoon, Gdańsk Bay, Puck Bay	YES
11.	*Amphibalanus improvisus*	whole southern Baltic Sea	YES
12.	*Caprella mutica*	Gdańsk Bay	-
13.	*Cordylophora caspia*	Szczecin Lagoon, Vistula Lagoon, Gdańsk Bay, Puck Bay	YES
14.	*Dikerogammarus villosus*	Szczecin Lagoon, Vistula Lagoon, Gdańsk Bay	-
15.	*Dikerogammarus haemobaphes*	Vistula Lagoon, Gdańsk Bay	-

No.	Taxon	Location of occurrence	Species recorded in the habitat *Large, shallow inlets and bays* (1160)
16.	*Eriocheir sinensis*	Puck Bay, Gdańsk Bay, Szczecin Lagoon	YES
17.	*Gammarus tigrinus*	Puck Bay, Vistula Lagoon, Szczecin Lagoon	YES
18.	*Hemimysis anomala*	Gdańsk Bay	YES
19.	*Marenzelleria* spp.	whole southern Baltic Sea, Vistula Lagoon, Szczecin Lagoon	YES
20.	*Mya arenaria*	whole southern Baltic Sea	YES
21.	*Mytilopsis leucophaeata*	Gdańsk Bay	-
22.	*Obesogammarus crassus*	Vistula Lagoon, Szczecin Lagoon, Gdańsk Bay	-
23.	*Orchestia cavimana*	Gdańsk Bay	YES
24.	*Palaemon elegans*	Gdańsk Bay, Puck Bay, Vistula Lagoon, middle coast of Poland	YES
25.	*Pontogammarus robustoides*	Vistula Lagoon, Szczecin Lagoon, Gdańsk Bay	-
26.	*Potamopyrgus antipodarum*	Szczecin Lagoon, Gdańsk Bay, Puck Bay	YES
27.	*Platorchestia platensis*	Gdańsk Bay	YES
28.	*Rangia cuneata*	Vistula Lagoon, coastal water of Gdańsk Bay (Śmiała Vistula)	-
29.	*Rhithropanopeus harrisi*	Gdańsk Bay, Vistula Lagoon, Szczecin Lagoon	YES
30.	*Branta canadensis*	Vistula Lagoon, Gdańsk Bay	YES
31.	*Chelon labrosus*	Puck Bay	YES
32.	*Cyprinus carpio*	Gdańsk Bay, Vistula Lagoon, Szczecin Lagoon	-
33.	*Neogobius fluviatilis*	Gdańsk Bay, Vistula Lagoon, the mouth of the Vistula	-
34.	*Neogobius melanostomus*	whole water of Polish Marine Areas	YES
35.	*Oncorhynchus mykiss*	Gdańsk Bay, Vistula Lagoon, Szczecin Lagoon, Pomeranian Bay	-
36.	*Acipenser gueldenstaedtii*	Gdańsk Bay, Puck Bay, Szczecin Bay, open water of Polish Marine Areas	YES
37.	*Palaemon macrodactylus*	coastal water of Gdańsk Bay (Śmiała Vistula)	-
38.	*Melita nitida*	Gdańsk Bay (Gdynia harbour)	-
39.	*Tubificoides heterochaetus*	Gdańsk Bay (Gdynia harbour)	-
40.	*Megabalanus coccopoma*	beach in Gdynia	-
41.	*Rangia cuneata*	Śmiała Vistula	-

2.3 Time and frequency of studies

Field studies for indicator 'Anthropogenic pressure in the coastal zone' should be done in June or in the first half of September, once in every a three-year period.

Field studies for indicator ‘Typical species of ichthyofauna” should be carried out in the summer season (June – September), once in every a three-year period.

For field studies of the indicators: 'Typical macrophytes taxa' and ‘Typical macrozoobenthos taxa' should be done in June, once in every a three-year period.

2.4 Equipment used in studies

For field studies of indicator ‘Anthropogenic pressure in the coastal zone’ the following equipment is recommended: map of the area, GPS, measuring tape, camera and field form.

For field studies of indicator ‘Typical species of ichthyofauna’ the following equipment is recommended: beach seine, waders, cuvette, bucket and field form.

For field studies of indices: ‘Typical taxa of macrophytes’ and ‘Typical taxa of macrozoobenthos’ the following equipment is recommended: DAK frame (Andrulewicz et al. 2004), spatula, mesh bags, plastic bags with string closure, Secchi disc, tweezers, field forms, diving equipment and a boat, enabling diving works equipped with a navigation system.

2.5 Examples of field and laboratory forms

MACROALGAE AND PHYTOPHILLOUS FAUNA FIELD FORM
Name of a site: *Puck Bay*
Institution: *Maritime Institute in Gdansk*
Name of a vessel: *TURBOT _PUCK*
Equipment/Sampling area: *DAK / 0,04m²*
Observed threats of the habitat: -

No.	Symbol of the station	Symbol of the sample	+/-	Date of the sampling	Time (UTC)	Vegetation coverage (attached) [%]*	Vegetation coverage (unattached) [%]*	Total vegetation coverage [%]*	Sediment [%]**	Secchi disk [m]	Depth [m]	Remarks
		1		*2017-06-05*	*8:00*	*50*	*15*	*50*	*sand in the top layer 100%, underneath the silt*	*2*	*2*	
		2										
		3										
		4										
		JAK										
		1		*2017-06-05*	*15:45*	*70*	*5*	*70*	*sand 100%*	*1,5*	*1,5*	
		2										
		3										
		4										
		JAK										

* rounded to 5%, coverage estimated at the station

** type of sediment on the station: boulder, stones, sand, gravel, silt, mussel aggregation, other; with vegetation coverage rounded to 5%

Compiled by:	**Checked by:**	**Approved by:**
Date:	Date:	Date:
Signature – full name:	Signature – full name:	Signature – full name:

LABORATORY ANALYSIS FORM FOR MACROPHYTES
Name of a site: *Puck Bay*
Institution: *Maritime Institute in Gdansk*
Symbol of a station: *19KII*
Symbol of a sample: *19KII/2*
Date: *2017-06-05*
Equipment/Sampling area: *DAK / 0,04m²*

No.	Taxon	Drying period		Biomass [g d.w.*/sample]	Remarks
		Date from	Date to		
1.	*Potamogeton pectinatus*	*2017-06-28*	*2017-07-17*	*1,7345*	
2.	*Pylaiella littoralis*	*2017-06-28*	*2017-07-17*	*0,1141*	
3.	*Chara baltica*	*2017-06-28*	*2017-07-17*	*0,0315*	

*d.w. – dry weight with accuracy to 0,0001 g

Compiled by:	**Checked by:**	**Approved by:**
Date:	Date:	Date:
Signature – full name:	Signature – full name:	Signature – full name:

LABORATORY ANALYSIS FORM FOR PHYTOPHILLOUS FAUNA
Name of a site: *Puck Bay*
Institution: *Maritime Institute in Gdansk*
Symbol of a station: *3F*
Symbol of a sample (repetition): *3F/S*
Date: *2017-06-05*
Equipment/Sampling area: *DAK / 0,04m²*

No.	Taxon	Abundance	Biomass [g w. w.]*	Remarks
1.	*Corophium multisetosum*	*2*	*0,002*	
2.	*Hydrobia sp.*	*1*	*0,047*	
3.	*Limecola baltica*	*1*	*0,015*	
4.	*Mya arenaria*	*3*	*0,213*	

[g w.w.] – grams of wet weight with accuracy to 0,001 g

Compiled by:	**Checked by:**	**Approved by:**
Date:	Date:	Date:
Signature – full name:	Signature – full name:	Signature – full name:

FIELD FORM FOR REEDS	
Institution: *Maritime Institute in Gdansk*	
Site: *Puck Bay*	
Date: *2016-07-27*	
Equipment: *camera for taking aerial photographs*	
State of the sea: *1*	Sea level [cm]: *507*
No of page of the form: 1 from ……	

Time (UTC)	**ID of section**	**Geographical coordinates**		**Azimuth [°]**	**Threats (code)**	**Remarks**
		Longitude	**Latitude**			
-	*1*	*18,56656*	*54,73853*	*0*	*1*	-
-	*1*	*18,56496*	*54,73897*	*0*	*1*	-
-	*2*	*18,77944*	*54,61374*	*0*	*2*	-
-	*2*	*18,77867*	*54,61383*	*0*	*2*	-

Compiled by:	**Checked by:**	**Approved by:**
Date:	Date:	Date:
Signature – full name:	Signature – full name:	Signature – full name:

FIELD FORM – ANTHROPOGENIC PRESSURE IN THE COASTAL ZONE		
Institution: *Maritime Institute in Gdansk*		
Site: *Puck Bay*		
Date: *2017-09-08*	Time of the starting (UTC): *11:40*	Time of end (UTC): *12:20*
Equipment: *GPS*		
State of the sea: *2–3*	Sea level [cm]: *515 (Puck)*	
No of page of the form: 1 from *10*		

Time (UTC)	**ID of section**	**Geographical coordinates**		**Symbol**			**Width of the beach [m]**	**Photo [yes/no]**	**Remarks/threats**
		Longitude	**Latitude**	**object (2)**	**erosion effect/ accumulation (3)**	**development of the shore (4)**			
11:45	*1*	*54°36,463'*	*18°30,461'*	*ur*	*pw*	*-*	*13*	*Y*	*Mechelinki collector*
11:46	*1*	*54°36,461'*	*18°30,462'*	*ur*	*pw*	*-*	*15*	*Y*	*Mechelinki collector*
11:56	*2*	*54°36,460'*	*18°30,461'*	*r*	*pw*	*-*	*15*	*Y*	*Storm collector*
11:59	*2*	*54°36,460'*	*18°30,461'*	*r*	*pw*	*-*	*15*	*Y*	*Storm collector*

Compiled by:	**Checked by:**	**Approved by:**
Date:	Date:	Date:
Signature – full name:	Signature – full name:	Signature – full name:

FIELD FORM – SANDBANKS
Name of a site: *Zatoka Pucka*
Institution: *Maritime Institute in Gdańsk*
Date of observation: *2016-07-27*

Threat code	**Name of the threat**	**Synthetic description**
F07	*Sports, tourism and leisure activities*	*Sport, tourism and leisure activities outside the urban and recreational zones (e.g. outdoor sports, leisure aircrafts, drones, human trampling, wildlife watching).*

Compiled by:	**Checked by:**	**Approved by:**
Date:	Date:	Date:
Signature – full name:	Signature – full name:	Signature – full name:

Fishing form			
Name of a site: *Zatoka Pucka*			
Way of fishing (mark **X**):	□ from boat	X wading	
Type of gear (mark **X**):	□ twaite shad floating gillnets	X hand trawl	□ electrofishing

No.	Station	Depth [m]*		Date	initial position of haul / catch			final position of haul / catch			Threats/Remarks
		P	K		Time	Latitude	Longitude	Time	Latitude	Longitude	
1.	*Hel*	*1*	*1*	*2016-07-11*	*10:15*	*54,60825*	*18,79722*	*10:20*	*54,60830*	*18,79730*	
2.	*Jurata*	*0,8*	*1*	*2016-07-11*	*12:10*	*54,68264*	*18,70902*	*12:15*	*54,68266*	*18,70912*	
3.	*Chałupy*	*1*	*1*	*2016-07-11*	*14:30*	*54,77923*	*18,45238*	*14:35*	*54,77928*	*18,45242*	

Compiled by:	**Checked by:**	**Approved by:**
Date:	Date:	Date:
Signature – full name:	Signature – full name:	Signature – full name:

*P – starting depth, K – final depth

Observation and measurement form
Name of a site: *Zatoka Pucka*

No.	Station	Date	Time	Weather conditions		Water parameters			
				Temperature [°C]	Cloudiness [8/8]	Temperature [°C]	O_2 [mg/l]	O_2 [%]	Salinity [PSU]
1.	*Hel*	*2016-07-11*	*10:10*	*26,3*	*0*	*17,3*	*8,8*	*95,3*	*7,0*
2.	*Jurata*	*2016-07-11*	*12:05*	*26,5*	*0*	*18,6*	*8,4*	*86,3*	*7,0*
3.	*Chałupy*	*2016-07-11*	*14:20*	*28,1*	*2*	*18,8*	*8,5*	*93,4*	*6,5*

Compiled by:	**Checked by:**	**Approved by:**
Date:	Date:	Date:
Signature – full name:	Signature – full name:	Signature – full name:

Analysis form			
Research station	*Hel*	**Date**	
		2016-07-11	
Species	**Abundance [ind.]**	**Weight [g]**	**Remarks**
round goby	*3*	*-*	
herring	*57*	*-*	
Remarks:			

Compiled by:	**Checked by:**	**Approved by:**
Date:	Date:	Date:
Signature – full name:	Signature – full name:	Signature – full name:

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