

Sectoral Interactions on the Tay Estuary and adjacent coastline of East Scotland: Montrose Basin to Fife Ness



Image ©Tracey Dixon



Report carried out for

marinescotland

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Executive Summary

Recent major legislative changes have taken place within the sphere of marine and coastal management with Scotland's Marine Act (2010) and the creation of Marine Scotland. Governance of Scotland's seas will take on new dimensions over the coming years with the emergence of marine spatial planning identified as a powerful tool for managing the marine environment. One of its key uses is its potential to identify and deliver options for the sustainable management of interactions (both positive and negative) among sectors operating in the marine environment.

The Tay Estuary Forum (TEF) has acquired information on the nature, extent and intensity of perceived interactions among sectors and subsectors within the Tay Estuary and coastline of east- central Scotland, from the River North Esk to Fife Ness, including the Tay Estuary to its tidal limit at Scone and 12 nm seawards of the baseline. Interviews have been carried out with 26 stakeholders from a range of activity sectors.

The TEF region is rich in biodiversity with nationally and internationally important designated species and habitats. Home to over half a million people, there are inevitable pressures along this stretch of coast where interactions between people, their environment and economic demands constantly evolve. This report presents interaction data as a colour coded matrix, assigning an interaction category (where possible) to interactions between activity subsectors, both human and physical.

“The Tay Estuary is recognised as one of the least developed and least polluted estuaries in Europe and is a benchmark for sustainability. The demands placed upon the river and estuary to support wildlife, leisure and tourism may seem to contrast with those of the human population but that impression underestimates the capability of the natural environment to accommodate the effects of human habitation and development. Overall, current environmental and economic demands are balanced and have created or sustain high levels of amenity and water quality”

(TEF Management Plan, 2009).

The TEF region has a varied coastline with a mix of rural and urban areas. Population centres at Dundee, Perth, St Andrews, Carnoustie, Arbroath and Montrose are well-spaced between features of natural beauty, such as the Eden Estuary, Tentsmuir Point, Barry Links, Lunan Bay the Rivers South and North Esk, Montrose Basin, and of course the Tay Estuary. The Tay hosts the largest stand of continuous reed in Britain (410ha) and Montrose Basin is one of the finest examples of an enclosed estuarine basin in the UK.

There are a multitude of coastal and estuarine users and operators in this region and generally the interactions between these users are well managed, either legally, voluntarily or through responsible behaviour and pragmatism. There are a small number of recognised areas of conflict. Trying to consider the perceived conflict from the position of another can be a valuable way of resolving this: this has been one of the key approaches promoted by the Tay Estuary Forum, along with the other Scottish Local Coastal Partnerships, for over a decade and the limited number of real conflicts is testimony to the effectiveness of this approach and to the strong inter-sectoral relationships that have been built over this period. Given the range of activities present in the TEF region, there are fewer unmanaged conflicts within and among sectors than might be anticipated.

1. Introduction

This research project has been carried out by the Tay Estuary Forum on behalf of Marine Scotland. The collated responses will contribute to the development of a Local Marine Plan for the Tay Estuary and adjacent coastline of eastern Scotland, and will inform future policy options for the management of Scotland's marine and coastal environment.

Marine planning is expected to provide a powerful tool for the management of the marine environment, and one key role is its potential to identify and deliver options for the sustainable management of interactions (both positive and negative) among sectors (Table I) in the marine environment. However, this will only work if there is informed input from key stakeholders during plan development.

This project is a key opportunity to ensure that each sectors' perceptions and concerns are represented in the future management of the Tay Estuary and coastline of east- central Scotland.

The Tay Estuary Forum (TEF) acquired information on the nature, extent and intensity of perceived interactions among sectors and subsectors within the Tay Estuary to its tidal limit at Scone, including the coastline north to the River North Esk and south to Fife Ness (Fig. 1). This stretch of coast has complex human interactions, with large areas of ongoing development, such as Dundee Waterfront, military bases at Barry Buddon and RAF Leuchars, Ports at Dundee, Montrose and Perth; a world- class coastal golf course at St Andrews and Offshore Wind developments outside the Firth of Tay. Physical features such as the Eden Estuary, Montrose Basin and Inner Tay Estuary local nature reserve all provide a variety of different habitats whose protection and long-term preservation must be actively balanced with human activities. Therefore, the area is an ideal testing ground for comparing perceived and actual sectoral interactions within the region, from both a human and physical point of view.

By hosting an Annual Conference in Dundee each year, the TEF help raise and address issues between sectors and subsectors. Promotion of discussion between various parties, and regular updates between Forum members ensures there is a constant portal to keeping updated with parallel, and perhaps complimentary sectoral activities on the Tay and adjacent coast. This is of key importance when assessing the nature, intensity and extent of sectoral interactions in this area. Generally speaking, issues are resolved before conflict arises, and where it does, the TEF are situated to help resolve the problem through means of un-biased communication, and the importance of this role cannot be underestimated.

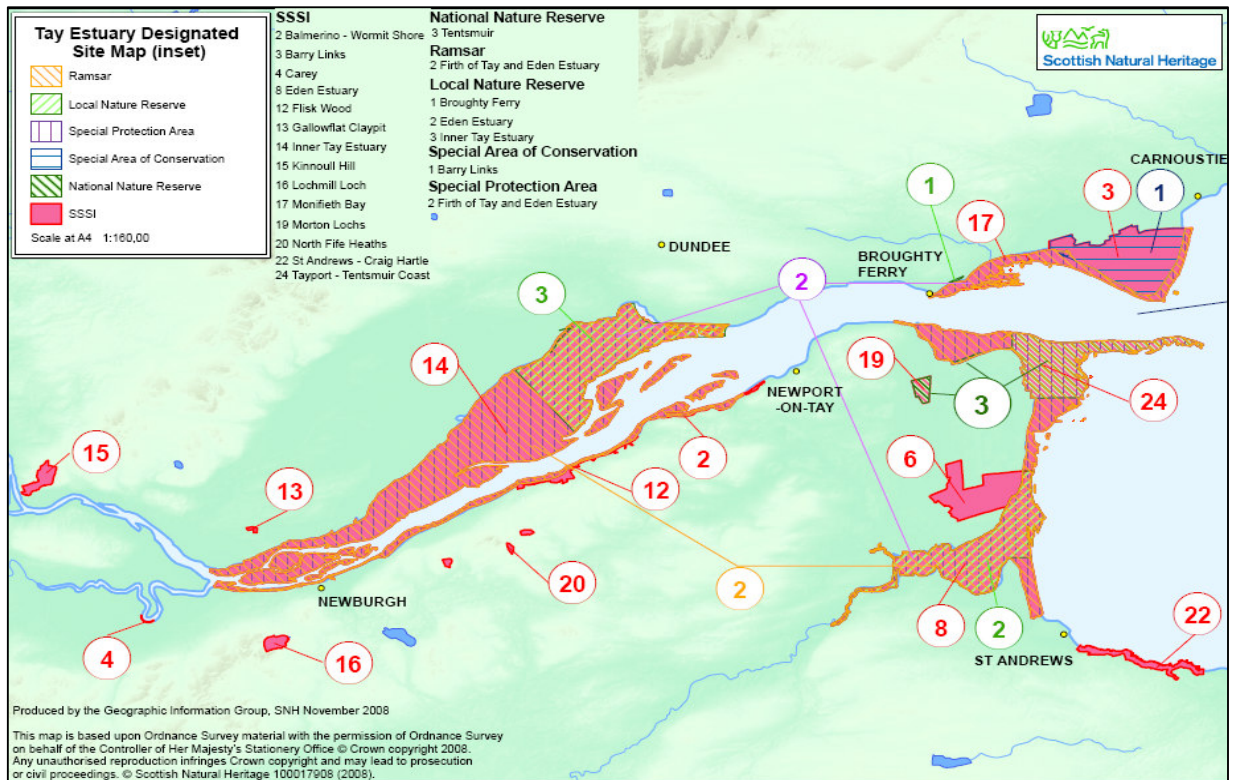
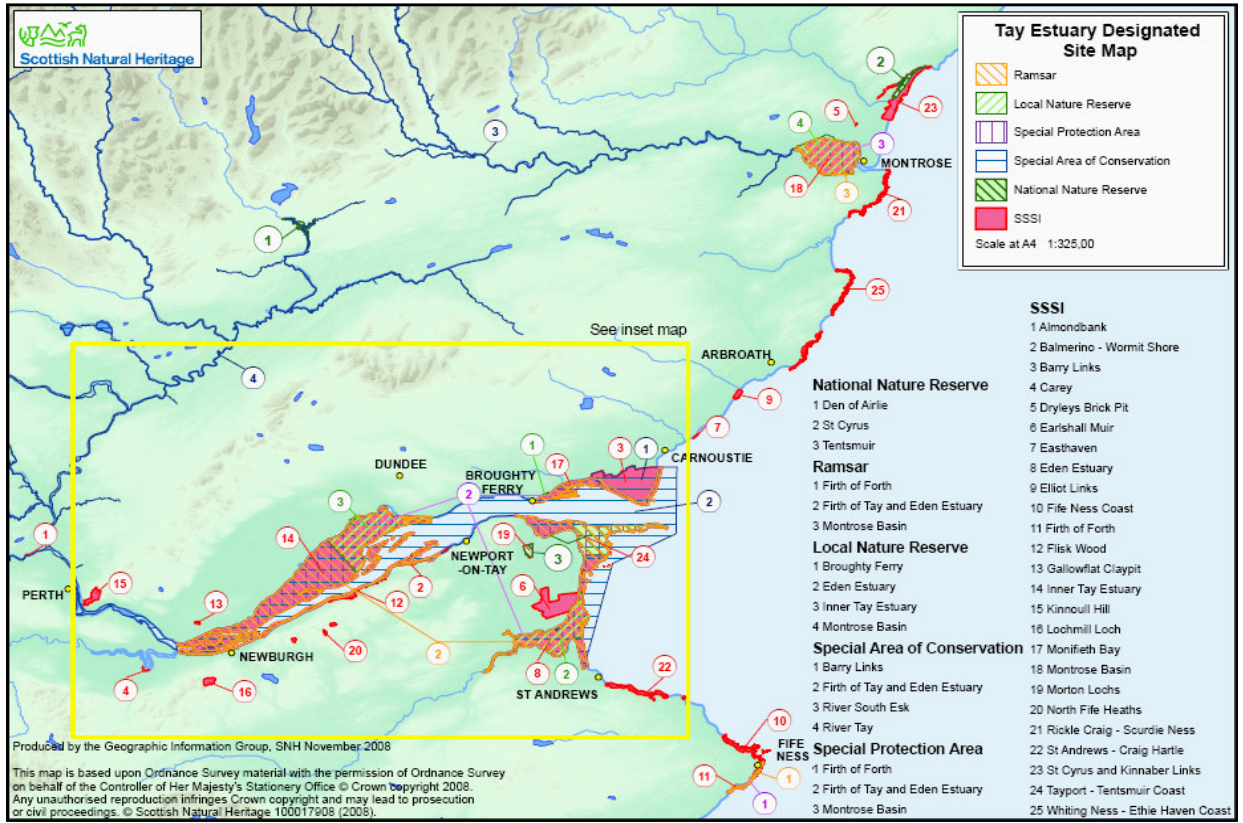


Fig 1: The Tay Estuary and adjacent coast, covered by the Tay Estuary Forum.

2. Methods

Representatives of the varying sectors (Table I) included in the matrix were sent an electronic copy of the matrix with accompanying methodology on how to complete it and background information on the rationale of the project. They were then free to complete the matrix, or to meet with the TEF Project Officer to go over the matrix in an interview, or both. Respondents are also given the opportunity to comment on the draft report.

Follow up interviews allowed the TEF, and ultimately Marine Scotland, to develop a greater understanding of the nature, intensity and physical area of perceived interactions and to explore management issues arising from these. The approach was informed by the Scottish Sustainable Marine Environment Initiative (SSMEI) Clyde Pilot¹, where information on the nature of interactions between activities in the coastal region could be visualised in the form of a colour coded matrix (Fig. 2). Each colour coded cell represents the interaction between the sub-sectors represented by intersecting rows and columns.

		AP	AQ	AR	AS	AT	AU	AV	AW	AX	AY	AZ	BA	BB	BC	BD	BE	BF	BG	BH
1	Subsectors	Coastal Estuarine Angling	Bathing (KSB)	Surfing / wind surfing / kite surfing	Ecotourism	Tourist accommodation / infrastructure while watching tours	Coastal infrastructure	Submarines	Surface vessels	Restricted areas	Exercise areas	Munitions dumps	Radar	Management of intertidal environment / communities	Management of seabed environment / communities	Management for breeding and wintering birds	Management for other mobile migratory species	Management of coastal habitats	Landscape management	Seascape management
		Sectors	Coastal Estuarine Angling	Bathing (KSB)	Surfing / wind surfing / kite surfing	Ecotourism	Tourist accommodation / infrastructure while watching tours	Coastal infrastructure	Submarines	Surface vessels	Restricted areas	Exercise areas	Munitions dumps	Radar	Management of intertidal environment / communities	Management of seabed environment / communities	Management for breeding and wintering birds	Management for other mobile migratory species	Management of coastal habitats	Landscape management
29	Maritime Safety	Lifeboat service																		
30		HM Coastguard																		
31	Recreation and Tourism	Cruisers																		
32		Yachts																		
33		Sailing dinghies																		
34		Small power boats																		
35		Jet skis																		
36		Marinas																		
37		Slipways																		
38	Moorings & anchorages																			

Fig. 2: Extract from the TEF Sectoral Interactions Matrix.

The attached Excel workbook (Appendix I) displays the TEF matrix which sector representatives were invited to complete. Where there are interactions with other sectors, they were asked to provide further details in interview, conducted by phone, or face-to-face.

¹ Sectoral Interactions in the Firth of Clyde <http://www.clydeforum.com/images/stories/doc/ssmei/sectoral-interactions-report.pdf>

Completing the matrix

Invited sector representatives completed the matrix with the TEF Project Officer by:

- Working down the column for each of their chosen subsectors. Each cell represents the interaction between the subsector named in the row with the interviewee's chosen subsector.
- In the relevant cell, the appropriate coding from the options below is entered:
 - **Positive (green)**: where the activity of the other subsector has a positive influence on the chosen subsector
 - **Neutral (blue)**: where the activity of the other subsector has neither positive or negative influence on the chosen subsector
 - **Competition (orange)**: where there is competition for access to the same resources or areas between the other subsector and the representative's subsector, managed or otherwise
 - **Conflict (red)**: where conflict arises as a consequence of unmanaged competition between the subsectors for access to resources or areas
 - **Incompatible (purple)**: where there is a fundamental and unmanageable incompatibility between the activity of the subsectors.

In some instances an interaction could not be assigned to a single category from the above list in such a clear cut way. In such cases a mixture of interactions would be entered into the cell, (diagonal hashed pattern) and reasons expanded upon in this report. Furthermore, sector representatives would provide a narrative for interactions during the interview. Naturally, some of the issues discussed are emotive and provoke strong opinions between stakeholders. This report aims to remain unbiased in its recording of interactions, and has striven to give all sectors the chance to contribute, in order that their views may be heard.

Other definitions:

MC: Managed Competition (where it was felt by the respondent that activities, although potentially competitive in theory, were currently being managed in a positive/ neutral manner. It is important to note that the **MC** category was widely felt by respondents to be a positive category, rather than seen as negative).

NI: Non Issue (where respondents felt there was no interaction at present).

NR: No Response

Sector Representatives from the list below responded to the consultation:

- | | |
|---|--|
| 1. Forth & Tay Navigation Service | 15. Fife Shoreline Management Plan |
| 2. Port of Dundee Ltd (Forth Ports Ltd) | 16. Perth and Kinross Heritage Trust |
| 3. St Andrews Sailing Club | 17. Fife Countryside Trust |
| 4. Marine Life Angus | 18. Catchment Tay Ltd |
| 5. Tay Regeneration Project | 19. Dundee City Council |
| 6. Inch Cape Offshore Wind Farm | 20. Broughty Ferry Lifeboat Station |
| 7. Scottish & Southern Energy | 21. SEPA |
| 8. The SCAPE Trust | 22. Tay Salmon Fisheries |
| 9. Ministry of Defence, Barry Buddon | 23. Blown Away Kite/ Land Surfing St Andrews |
| 10. Tay Road Bridge Board | 24. Dundee Renewables |
| 11. South East Scotland Inshore Fisheries | 25. Tayside Sea Kayakers |
| 12. Ye Amphibious Bathing Association | 26. Keep Scotland Beautiful |
| 13. Coastwatch Tay | |
| 14. SNH | |

For the purposes of the interviews, and this report, activity along the TEF coast was categorised into 15 sectors, and a further 71 sub-sectors, based on the Clyde template (Table I):

Table I: Categories of coastal and marine activity along the TEF Coast

Activity Sector	Activity Sub-sectors	
Renewable Energy	Offshore wind	Tidal stream
	Wave power	Tidal barrage
	Micro-renewables	
Subsea cables and pipelines	Electricity	Telecommunications
	Oil/Gas	
Inshore Fisheries	Nephrops Trawl	Creeling
	Scallop Dredge	Diving
	Demersal Trawl	Intertidal Shellfishing
	Pelagic Trawl	Processing
	Longline	
Aquaculture/Processing	Onshore finfish	Shellfish
	Offshore finfish	Processing
Shipping and Transport Ports and Harbours	Commercial cargo vessels/ rigs	Passenger vessels
	Commercial Ports	Conservancy (dredging/navigational aids)
	Recreational harbours/jetties	
Maritime Safety	Lifeboat service	HM Coastguard
Recreation and Tourism	Cruisers	Boat building / repair
	Yachts	Sea kayaking
	Sailing dinghies	Recreational diving
	Small power boats	Coastal/ Estuarine angling
	Jetskis	Bathing
	Marinas	Wind/kite surfing
	Slipways	Eco-tourism
	Moorings and anchorages	Tourist infrastructure
Naval defence	Coastal infrastructure	Exercise areas
	Submarines	Munitions
	Surface vessels	Radar
	Restricted areas	
Natural heritage management	Intertidal environment/communities	Other mobile/migratory species
	Seabed environment/communities	Management of coastal habitat
	Breeding and wintering birds	
Landscape and seascape management	Landscape management	Seascape management
Environmental Quality management	Bacterial quality	Chemical quality
	Biological quality	Physical quality
Historic and cultural heritage management	Coastal monuments and archaeology	Marine monuments and archaeology
Coastal development	Power stations	Road/Transport
	Residential	Coastal defences
	Industrial	
Waste management	Sewage disposal	Rubbish disposal

3. Results

The TEF Sectoral Interactions Matrix

Appendix 1 shows the colour coded TEF Sectoral Interactions Matrix in its entirety. With 71 subsectors spread across identically labelled rows and columns, and 71 cells excluded from any analysis since they represent a subsector interacting with itself (marked as black cells in Appendix 1).

3.1 Renewable Energy

All the renewable energy subsectors interacted either neutrally or positively with each other. With the Round 3 Offshore Wind development lying offshore from the Tay Estuary, this sector was a relevant and important topic of discussion for most stakeholders. Consent applications for the Inch Cape offshore wind farm will be submitted to Marine Scotland by early 2013. Currently, baseline information is being collected, with respect to birds, marine mammals, shipping and navigation, metocean, benthic communities, noise, socio-economics, archaeology, aviation and commercial and natural fisheries. By mid 2012 potential impacts of the proposed development on the receptors and baseline environment will be assessed.

3.2 Subsea cables and pipelines

All recorded interactions are based on Scottish & Southern Energy's existing electrical network and ignore future proposals and/or development. Due to the nature of the subsectors within Subsea Cable and Pipelines (Electricity, Oil/Gas and Telecommunications), their interactions with other subsectors can be treated collectively. SSE Distribution cables affecting TEF region are: Two 33,000volt cables in the Tay Estuary close to the River Earn, one 11,000volt cable in the South Esk Estuary at Montrose and two abandoned subsea cables in Montrose Basin. A 132,000volt overhead transmission line crosses the Tay Estuary close to the River Earn. Interactions between subsea electricity cables and offshore wind could be positive - this is largely an unknown factor at this point until potential export cable routes from the proposed Inch Cape offshore wind farm to a landfall location on the coast are defined. The impacts/conflicts with inshore fisheries and aquaculture stakeholders remains unknown at this point.

3.3 Inshore Fisheries

Scallop dredge was the only subsector to identify conflict with other subsectors of: Creel fishing, seabed environment/ communities, management of coastal habitats and seascape management. Also, intertidal shellfish extraction conflicts with intertidal/ seabed communities. Inshore Fisheries noted positive interactions with Boat building/ repair; Maritime Safety and Water Quality sectors.

3.4 Aquaculture and Processing

The four subsectors of Aquaculture and Processing were perceived to have no issues with any other subsector due to their absence in the Tay, so are excluded from any further analysis.

3.5 Shipping and Transport

Tankers of up to 150,000 tonnes, exceeding lengths of 250m (to a maximum of 300m) are able to dock at Port of Dundee. Regular cargo passing through the port includes oil and gas, fertiliser, timber, and grain. The port currently carries out general maintenance and repair to Jack-up rigs for the offshore oil industry, the most recent being the *Rowan Norway* which left Prince Charles Wharf in early 2012.

Day-to day overseeing of shipping movement around this stretch of coast is carried out by the Forth & Tay Navigation Service, based at Grangemouth. The Port of Dundee Harbour Master is in charge of vessels whilst in port.

Port of Dundee carries out an annual surveying and dredging programme, with most material removed from the berths alongside the commercial wharfs, rather than maintaining open channels. Dredging is widely perceived as having the greatest environmental impact of the Port's regular activities, despite the relatively small quantities of sediment/ silt dredged at Dundee.

- Port of Dundee intends to attract manufacturing companies to Dundee for wind turbines as part of Round 3 developments outside of the Forth and Tay Estuaries. Therefore from a business point of view, interactions with the Offshore wind sector, are largely positive.
- The location of wind farms will undoubtedly have an impact on shipping routes in and out of the Tay (and Forth) Estuaries but regular communication has been upheld throughout the development process to ensure key navigation channels/ traffic routes are left open. Patterns of ships tracks in relation to Round 3 wind farm sites have been mapped, ensuring key channels are left intact. Initial discussions with developers helped overcome difficulties in understanding economics of shipping, e.g. in order for a ship to deviate just a few miles from its normal route around a wind farm could affect its commercial viability in terms of fuel cost; particularly if this was a regular route for the vessel. Port representatives invited to attend Offshore wind workshops and communicate regularly with developers.

3.6 Ports and Harbours

Port of Dundee engages regularly with various bodies, such as Offshore wind companies, SEPA, Dundee's Waterfront Development process, Shoreline Management Plans, Tay Estuary Forum. Port also liaises with yacht clubs about river safety and navigation. As a high priority, each year, the Port coordinates oil spill contingency exercise for dealing with emergency spills, revising the plan every 5 years.

Port activities undoubtedly face competition with other subsectors but this is viewed as managed competition to a large extent, either by regulations or by mutual understanding.

3.7 Maritime Safety

The Lifeboat service was seen as a positive sector by all, interacting either positively/ neutrally with most subsectors, and negatively with none.

Coastwatch Scotland's Tay Section (<http://coastwatchscotland.btck.co.uk/>) is a coastal safety monitoring organisation, based at Broughty Ferry, presently consisting of 6 volunteers. The team operate along the Tay river and foreshore, including Broughty Ferry harbour (as a busy hot spot) up-river to Wormit and Newburgh.

Interactions with other subsectors are largely positive, with Coastwatch Tay fulfilling a training/ educational role in promoting sea safety, to the benefit of many of the listed subsectors, e.g. operating VHF marine radio training courses for mariners (including several fishermen), highlighting pollution issues, and providing marine mammal medics who can assist with wildlife strandings, injuries etc. They also perform an assisting role to emergency oil spill clean-ups and have links to *Safe Tay*, a campaign set up to provide lifesaving equipment linked with CCTV systems at Perth which can summon rescue services on the inner Tay, with plans to extend down- estuary. (<http://www.safe-tay.co.uk/>).

Coastwatch Tay raised issues surrounding personal powercraft use, particularly jet skis at Broughty Ferry; highlighting problems with users sometimes failing to adhere to speed restrictions (5 knots within Broughty Ferry harbour, shown in Figure 3). Local by-laws issued by Forth Ports are currently difficult to enforce and police. HM Coastguard, Forth Ports, Tayside Police and Coastwatch are collectively striving towards creating an Action Plan to enforce charges for breaching by-laws.

Jet skiing is currently an un-licensed activity which can cause problems. As Dundee is a working harbour which regularly hosts large vessels and rigs, it is essential that all recreational water users be fully informed on the "rules of the road", avoiding potential for serious injury, both to themselves and other vessels.

There are issues surrounding proximity of personal powercraft to marine mammals (dolphins and seals) in the estuary. It is still unclear whether dolphins are perhaps attracted to jet skis or if jet skiers are simply getting too close. The majority of jet skiers, particularly linked with clubs, act responsibly and it is only a few individuals which act inappropriately.

The No-Go area for powercraft seen in Figure 3, lying east of Broughty Ferry castle, is frequently ignored by powercraft, particularly jet skis which flout its boundary. Policing this area is difficult as jet skis are not a vessel currently covered under the International Collision at Sea Law, therefore the only way the Coastguard could legally intervene, at present, is in the instance of a maritime accident.

It is often difficult to identify offending jet skis/ power boats as there is no registration scheme on the river. The high volume of commercial traffic using the river would make a registration scheme difficult to manage.

There is a general lack of awareness about maritime signalling, with personal watercraft users not adhering to speed limits or safe swim zones. Swimmers sometimes mistake their designated safe-swim zones as the opposite, a no-swim zone, causing them to swim in

unsafe water areas, and not in the areas intended for them. Coastwatch Tay is working to remedy this by raising awareness of the different signalling measures used, and publicising these at the beach. Seasonal influx of tourists at the beach means this message needs constant reinforcement.

Water markers, such as the Alpha flag, (flown at the mouth of the harbour when bathers are present) and speed-limit buoys are used to denote safe areas/ life-guard zones during the summer months at Broughty Ferry.

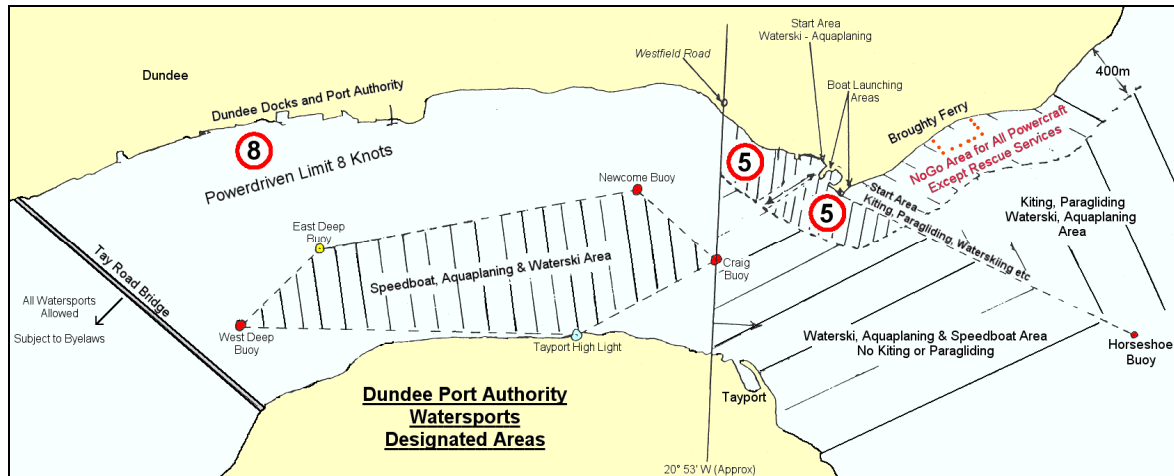


Fig 3: East Coast of Scotland River Tay Sporting and Recreation, designated areas. Dundee Port Authority (Taken from: <http://coastwatchscotland.btck.co.uk/Information/TayByelaws>)

Alongside its safety observational duties, Coastwatch Tay is an active partner in the UK Governments National Counter Terrorism strategy, project KRAKEN in the Tayside and Lothian & Borders police force areas.

Coastwatch Tay has positive links with various recreational user groups on the Tay e.g. Tayside Sea Kayaks, for whom they provide an On/ Off- water safety board for lone kayakers to sign, whilst encouraging contact with HM Coastguard. Coastwatch has also provided safety boats to accompany swimmers with Ye Amphibious Bathing Assoc.

3.8 Recreation and Tourism

Responses were collected from Ye Amphibious Bathing Association, St Andrew's Yacht Club, Tay Salmon Fisheries and *Blown Away*, a Kite and Land- Surfing company operating at West Sands beach in St Andrews. Several areas of conflict were identified e.g. between personal water craft (yachts, cruisers and sailing dinghies) with the water quality and waste management (rubbish and sewerage disposal). The Bathing subsector highlighted conflict with personal watercraft including jet skis:

“Jet skiers have always been a problem to us over the years and to the dolphins as there was less of them appearing last year. We have tried on numerous occasions to liaise with Jet Ski clubs and on the whole they are okay. but when someone buys a new

jet ski and has no idea what the alpha flag stands for or what the harbour master rules, it is chaos and they just ride all over the place. We realise it is a public harbour and we do try to work with all water users. The kayak crews are fine and supportive and you will never see them go close to any wild life” Ye Amphibious Bathing Assoc.

This excerpt raises an important point regarding liaison with recreational user groups which do not have adequate representation. Numerous media articles have been written reporting on irresponsible use of personal water craft interacting negatively with wildlife, or other water users. However, without the means of effective communication, neither party feels their views are heard and frustrations can arise. The majority of jet skiers operating from Broughty Ferry adhere to regulations and feel demonised by irresponsible actions of the minority. Several interviews raised the problem of inadequate policing of the rules and regulations on the coast and estuary; felt by some to be lacking. This could be down to many reasons, e.g. being financially unviable and there was some confusion as to who the responsibility fell to: Port Authority, Police, Local Authority or Coastguard to name a few, from some recreational sectors.

As a representative for the jet skiers was unable to be found in completing the SIM, thereby compounding the problem.

Blown Away, a Land and Kite Surfing company operating all year round at West Sands, St Andrews expressed that competitive use of the beach was currently well-managed, with good communication upheld between operators like themselves, the Local Authority, beach management group and the general public. Any negative interactions are rare, and usually down to individuals, with incidences are quickly dealt with, before issues arise. There is an issue regarding public toilet facilities for visitors to the beach, which are currently seasonal, and relatively sparse. This has led to some members of the public using the dune area instead, which in turn raises beach and water quality issues.

Through effective communication, previous litter problems associated with beach parties are now greatly reduced, with people taking their litter home with them, seemingly more conscious of rubbish removal.

There were several reported incidences of competition with some personal watercraft users, particular power boats and jet skis, although these incidences are infrequent at West Sands.

The company did raise concerns over the relocation of HM Coastguard services at the beach with the closure of Crail lifeboat station. There are Coastguard Rescue Teams stationed at St Andrews (East Sands) and at Carnoustie.

Tayside Sea Kayakers identified conflict between large ships and kayaks:

“We have to scuttle out of their way, obviously”.

Also other craft were noted to sometimes behave in an inconsiderate manner. An issue with finding items of rubbish and sewage in the sea was highlighted, sometimes seen in the Tay Estuary, and water quality, which is sometimes poor on the south side of the estuary.

3.9 Naval Defence

Most of the conflicting interactions with this sector are due to restricted access issues to MOD land at Barry Buddon, and RAF Leuchars. There is therefore (to a certain extent inevitable) conflict between recreational subsectors involving personal watercraft, with regard to enforcing restricted areas and exercise zones. Coastal infrastructure associated with defence, along with restricted/ exercise areas also conflict with landscape management and management of coastal habitats. However, positive interactions between infrastructure and coastal defence, as well as with HM Coastguard were noted.

3.10 Natural Heritage Management

Aspects of waste management in particular was identified as a conflicting subsector with Natural Heritage Management. Conflict arises in terms of inadequate rubbish disposal causing damage to a variety of species and habitats.

3.11 Landscape and Seascape Management

Within Landscape and Seascape Management, all subsectors were seen to interact neutrally with some competitive interactions identified with other subsectors. However conflict and even incompatibility was recorded with offshore wind and tidal barrage subsectors respectively.

- NB: The conflicts between landscape/ seascape management with offshore wind are actual, and current. The incompatibility of tidal barrage with landscape/ seascape management is perceived, as there are no current plans to create a tidal barrage within the Tay. Perceptions must be guarded against in delivering an accurate portrayal of how sectors presently interact with each other in reality.

3.12 Environmental Quality Management

SEPA welcomes the TEF partnership approach in using an interactions matrix. However, as a regulator, SEPA has many interactions with different industries and feel the matrix is not an appropriate mechanism to record this.

Scottish Environment Protection Agency (SEPA) has a key role in the environmental quality management sector. They also provide advice, work with and, in some instances, regulate, aquaculture, tourism sites such as bathing beaches, coastal development and flooding. SEPA's role is different above and below the mean High Water Mark, where some responsibilities are controlled by Marine Scotland. SEPA's role includes:

- the provision of advice and legislative protection on matters relating to the Water Framework Directive (WFD), which sets out the standards for the water environment, including coasts and estuaries. This includes the quality and quantity of water, the presence of certain invasive non-native species and the condition of the beds, banks and shores.
- monitoring and reporting on the condition of Scotland's beaches as identified under the Bathing Waters Directive and where necessary sets in place measures to improve the water quality.

- carrying out monitoring of the water environment to assess its quality and to identify potential pollutants. This helps to inform the WFD river basin management plans and our legislative responsibilities.
- regulating discharges to the water environment, including coastal and estuary sites.
- providing advice to planning and regulation of water quality in relation to aquaculture.
- working with local people to improve the status of the water environment through the river basin planning process and with the support of Advisory Groups.
- responsibility to identify coastal areas that are potentially vulnerable to flooding and provide a strategic framework to mitigate for flooding – although the responsibility for carrying out flood alleviation work remains with the local authority.
- responsibility to support the Scottish Biodiversity Targets for the marine environment and all regulatory decisions should take account of the potential impact on biodiversity and the opportunity for biodiversity enhancement
- provision of advice on the impact of renewable energy production within the marine environment.

SEPA is keen to see continued improvement and integration with other sectors and see the following as key to this process:

- The Better Regulation process
- River Basin Planning Advisory Groups
- Flood Advisory Groups
- Scottish Marine Regions for marine planning

There is a continuing need to provide information and advice on issues such as diffuse pollution so that land owners and managers are able to reduce their impacts through better management.

Considerable work has already been undertaken to raise awareness of the water environment and a number of new controls have been introduced under the Water Environment and Water Services (Scotland) Act. SEPA is always keen to explore way of improving our interaction with our specific sector and those people we are involved in through our regulatory or advisory responsibilities. As part of this we have recently undertaken a 'Better Regulation' consultation, the outputs can be found on our website.

As Scotland's environmental regulator, SEPA's main role is to protect and improve the environment. This is achieved by helping business and industry to understand their environmental responsibilities, enabling customers to comply with legislation and good practice and to realise the many economic benefits of good environmental practice.

As expected from a Regulator, SEPA authorises activities that could affect the water environment by requiring the operator to meet certain conditions. This could include details of the nature of a discharge, the amount to be abstracted or the type of radioactive substance to be used.

SEPA also provides advice to many different organisations in relation to the marine environment. There is a wider benefit to society if the marine environment is in good condition (as set out in the Water Framework Directive). It ensures that people visiting our coastline for leisure or recreation have a positive experience and get a chance to see

healthy and varied wildlife and plants. SEPA also monitor bathing waters and help to find ways of reducing any potential pollution inputs.

In addition, through the river basin planning process, which considers how best to improve and maintain the condition of coastal and estuary waters, SEPA has developed close working relationships with the people involved with our seas through the Area Advisory Groups (AAGs). As the Scottish marine regions and flood advisory group develop SEPA will ensure consistent engagement. The Tay Estuary Forum is a member of the AAG.

3.13 Historic and Cultural Heritage Management

Perhaps the biggest threat to the archaeology of the Tay Estuary is that it is still very much unrecognised. There has not been intensive coastal and/or inter-tidal surveys carried out in the Tay as has been done in other areas of Scotland, e.g. the Solway Firth. Therefore we can't measure impact on what we don't know is (or isn't there). The best example of this is the 3000 year old Carpow boat - which was exposed out of the mud for the last few hundred years, but there was no record of it. Acquiring more baseline info' needs to be a priority.

The onshore and seabed infrastructure associated with offshore development has the potential to negatively impact coastal and marine archaeology and requires management through the EIA process. Good management and mitigation of development may result in positive outcomes e.g. increasing knowledge about the archaeology of the coastal and marine monuments.

Unless designated areas of the seabed are avoided, dredging activities related to fishing are unmanaged and have a negative impact upon seabed archaeology. Activity related to shellfish exploitation and fish and processing may impact coastal and marine archaeology although this is low risk, and less of an issue in the Tay itself due to absence of Aquaculture.

Operation of port infrastructure has no impact on coastal and marine archaeology. Development of port infrastructure can damage coastal and marine archaeology and requires management and mitigation through the planning and EIA process. Where effectively implemented this may result in positive outcomes for understanding and appreciation of coastal and marine archaeology. Dredging in new areas has the potential to damage marine archaeology.

Small scale coastal development can be damaging and requires management and mitigation through planning processes. Where effectively implemented this may result in positive outcomes for understanding and appreciation of coastal and marine archaeology.

Recreational divers have caused damage to marine monuments, particularly wrecks. However, with improved awareness and education of the historic value of marine archaeology divers now play a significant positive role in monitoring and reporting on marine archaeology. Sea kayakers similarly report on coastal and marine archaeology and can access remote areas where land access is difficult.

Development of tourist infrastructure can be damaging and requires management and mitigation through planning processes. Where effectively implemented this may result in

positive outcomes for understanding and appreciation of coastal and marine archaeology. Impact of visitors needs to be carefully managed. Moorings and anchorages can cause cumulative damage to marine monuments and archaeology.

Water quality and burial environment can impact organic archaeological deposits, e.g. wooden remains, peat, etc. Marine organisms can have negative impact upon organic coastal and marine archaeological remains, e.g. shipworms can rapidly destroy underwater historic timber.

Occasional conflict may arise with habitat restoration programmes which involve engineering works which can damage coastal archaeology. If effectively managed this can result in improved understanding and appreciation of coastal and marine archaeology. Management of coastal habitat may sometimes restrict access to archaeological sites and monuments.

Development of coastal infrastructure, along with military coastal infrastructure can also damage coastal and marine archaeology and requires management and mitigation through the planning and EIA process. Where effectively implemented this may result in positive outcomes for understanding and appreciation of coastal and marine archaeology.

3.14 Coastal Development

Dundee Waterfront is undergoing major development currently, with construction of the V&A Museum, realigning of the Tay Road Bridge ramps and creation of new docks aiming to bring the city centre closer to its estuary. Residential and Industrial development responses largely mirror each other, with a few notable exceptions .e.g. conflict has arisen from a residential perspective over siting of the offshore wind sites within view of the coast, specifically at Arbroath, and from Dundee Law. There are instances of industrial developments conflicting with water quality although this is largely competitively managed.

Angus Council are currently reviewing their Shoreline Management Plan, which will allow the development of Shoreline Management Plan II.

3.15 Waste Management

Most, if not all sectors have the potential to create litter by nature of their activities. This is not to say all sectors do create litter, but those marked “competition” have increased capacity to, and therefore create competition with a litter free environment, if poorly managed. Marine litter is viewed as a high-priority problem by many stakeholders, notably local authorities and natural heritage interests, in terms of both aesthetics and damage to fishing nets, property, or injury to wildlife. Local initiatives, carried out by Local Authorities, Keep Scotland Beautiful, the Marine Conservation Society and the Tay Estuary Forum itself contribute to mechanisms to address coastal and marine litter. Moreover, voluntary schemes e.g. Green Blue Initiatives aim to discourage dumping of rubbish by leisure craft, as do management schemes of marinas and yacht clubs.

4 Conclusions

The matrix design and the constraints imposed by selecting a single category for each interaction does force the matrix towards a simplistic snap-shot of activities on the Tay that fails to capture actual complexities. Often within one cell there can be multiple choices for categorising interactions. Furthermore, the basic matrix itself does not indicate the intensity or geographical location of interactions. However, in combination with stakeholders comments, discussed above, the matrix and this report provide valuable insights into prioritising where particular management attention should be focussed.

The overall success of the Matrix depends entirely on the willingness of all sector representatives to be involved. Where matrices are left incomplete, or with gaps, there is danger of bias, if all sides are not taken into account and recorded in the same manner.

The breakdown of interaction types by percentage demonstrates that over half of the interactions are perceived to be either neutral (of little consequence to either subsector) or are competitive, but managed. There is a fairly high percentage of positive interactions recorded within the region which is encouraging. The large proportion of interactions that are deemed to be not an issue at all in the Tay is largely due to the design of the matrix itself: Sectors such as aquaculture, some subsectors of renewable technology and fishing types are not present in the Tay. These activities were included in the TEF matrix to allow comparisons between this coastline and other parts of the Scottish coast where similar work is being carried out.

