

**Habitats Regulations Assessment document: NCSPA – tLSE 038**

<b>European Marine Site:</b>	<b>Northumbria Coast SPA</b>
<b>Generic sub-feature(s):</b>	<b>Estuarine Birds, Intertidal Bedrock Reef, Intertidal Boulder and Cobble Reef.</b>
<b>Gear type(s):</b>	<b>Handwork (access from land)</b>
<b>NIFCA tLSE type:</b>	<b>Detailed</b>
<b>Gear/feature interaction reference(s):<sup>1</sup></b>	<b>NCSPA – 265 NCSPA – 267 NCSPA – 268</b>

<b>Revision history</b>		
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<b>Has Natural England been formally consulted on this tLSE (and do they agree)?</b>	<b>Yes</b>
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<b>Date of document completion/'sign-off':</b>	<b>27/07/23</b>
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**Test for Likely Significant Effect (LSE)**

**NCSPA – 267: Intertidal Bedrock Reef**  
**NCSPA – 268: Intertidal Boulder and Cobble Reef**

<b>1. Is the activity/activities directly connected with or necessary to the management of the site for nature conservation?</b>	No
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<p><b>2. What pressures (such as abrasion, disturbance) are potentially exerted by the gear type(s)?</b></p> <p>Pressures listed are all those for which the feature is deemed to be sensitive.          Pressures in bold are Medium-High Risk.          The sensitivities listed are based on the 2018 conservation Advice available on Natural England's Designated Site System.</p>	<p><b>Abrasion/disturbance of the substrate on the surface of the seabed</b></p> <p><b>Habitat structure changes - removal of substratum (extraction)</b></p> <p><b>Penetration and/or disturbance of the substratum below the surface of the seabed, including abrasion</b></p> <p><b>Removal of non-target species</b></p> <p><b>Removal of target species</b></p> <p>Deoxygenation</p> <p>Introduction of light</p> <p>Introduction or spread of invasive non-indigenous species (INIS)</p>
<p><b>3. Is the feature potentially exposed to the pressure(s)?</b></p>	<p>Yes</p>

#### 4. What are the conservation objectives for the feature?

The conservation objectives that might be affected by hand gathering are underlined.

The conservation objectives for 'Intertidal' supporting habitat for designated bird feature(s) are set to:

##### Maintain:

- Air quality: Maintain concentrations and deposition of air pollutants to below the site-relevant Critical Load or Level values given for this feature of the site on the Air Pollution Information System ([www.apis.ac.uk](http://www.apis.ac.uk)).
- Conservation measures: Maintain the structure, function and supporting processes associated with the feature and its supporting habitat through management or other measures (whether within and/or outside the site boundary as appropriate) and ensure these measures are not being undermined or compromised.
- Extent of habitat: maintain the extent, distribution and availability of suitable habitat (either within or outside the site boundary) which supports the feature for all necessary stages of the non-breeding/wintering period (moulting, roosting, loafing, feeding) at: Intertidal rock (497.8 ha), Intertidal coarse sediment (31.5 ha), Intertidal mixed sediments (7.2 ha), Intertidal stoney reef and Intertidal biogenic reef: mussel beds (35.9 ha) and Atlantic salt meadows (*Glaucopuccinellietalia maritimae*) (1.2 ha – Turnstone only).
- Food availability (bird): Maintain the distribution, abundance and availability of key food and prey items (eg. *Mytilus*, *Littorina*, kelp-fly larvae, *Nucella* (PS only), *Balanus*, *Carcinus*, *Gammarus*, dipertan flies (TS only)) at preferred sizes.
- Landscape: Maintain the area of open and unobstructed terrain around roosting and feeding sites.
- Vegetation characteristics for roosting: Maintain a vegetation structure of key roost sites dominated by bare ground or a short sparsely-vegetated sward.
- Water quality – dissolved oxygen: Maintain the dissolved oxygen (DO) concentration at levels equating to High Ecological Status (specifically  $\geq 5.7$  mg L<sup>-1</sup> (at 35 salinity) for 95 % of year), avoiding deterioration from existing levels.
- Water quality – nutrients: Maintain water quality at mean winter dissolved inorganic nitrogen levels where biological indicators of eutrophication (opportunistic macroalgal and phytoplankton blooms) do not affect the integrity of the site and features, avoiding deterioration from existing levels.
- Water quality – turbidity: Maintain natural levels of turbidity (e.g. concentrations of suspended sediment, plankton and other material) across the habitat.

##### Reduce:

- Water quality – contaminants: Reduce aqueous contaminants to levels equating to High Status according to Annex VIII and Good Status according to Annex X of the Water Framework Directive, avoiding deterioration from existing levels.

The conservation objectives for Intertidal Rock features for the Berwickshire and North Northumberland Coast SAC were used prior to the availability of conservation objectives for Northumbria Coast SPA. The conservation objectives listed below were used to inform this assessment.

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|--|---|
|  | <ul style="list-style-type: none"><li>• <u>the presence and spatial distribution of intertidal rock communities.</u></li><li>• <u>the abundance of listed species, to enable each of them to be a viable component of the habitat.</u></li><li>• <u>the species composition of component communities.</u></li></ul> |
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**5. What are the potential effects/impacts of the pressure(s) on the feature, taking into account the exposure level?**

The NCSPA boundary stretches sporadically along the Northumberland coastline from the river Tweed to Blackhall Rocks (NEIFCA district) (Annex 1) as the designated supporting habitat of rocky reef is not continuous. There are three known types of intertidal hand gathering for invertebrates occurring within Northumbria Coast SPA: hand gathering for periwinkle (*Littorina littorea*) and for shore/peeler crab (*Carcinus maenus*), and cleeking for European lobster (*Homarus gammarus*).

NIFCA have also received requests to carry out collection of seaweed and are aware of a commercial operator planning to carry out collection of seaweed species on a commercial basis (more information is needed on the area and scale of this activity before assessments can be carried out). As this is a new activity it requires an assessment to be carried out, this falls outside of the original Article 6 assessment process. A separate assessment will be conducted when information on this activity is provided by the applicant. They have been told of the legal requirements and necessity of needing appropriate permissions.

Due to the differences in the way hand gathering of periwinkle and shore/peeler crab versus cleeking is carried out they will be considered separately throughout the document. There is no national description of what is commercial and what is recreational levels of collection, therefore activity has been assessed regardless of the end point of the catch, since it is the activity linked to effort that impacts rather than whether it is commercial or recreational in nature.

Hand gathering involves the collection of periwinkles or shore crab by hand from the intertidal rocky areas, which can involve turning rocks, cobbles or boulders. Cleeking is a traditional method of catching lobster involving using a long pole with a hook to tease lobsters from under rocks or in crevices. Lobster will use their claws to clamp onto the hook and are removed from the sea. The activity is highly seasonal concentrated during the summer months. Both activities occur on rocky intertidal areas, the habitat of the target species. These activities occur along the rocky intertidal/infralittoral habitats on the Northumberland Coast within other MPAs including the Berwickshire and North Northumberland Coast SAC and Coquet to St Mary's MCZ, hand gathering activities in these sites will be assessed in other HRA and MCZ assessments carried out by NIFCA.

**Hand gathering targeting shore crabs**

NIFCA officers record sightings of intertidal hand work activity observed during routine patrols when a site visit coincides with low water ( $\pm 2$  hours). Between January 2016 and October 2021, 323 visits to handwork locations within Northumbria Coast SPA were made by officers. 129 individuals were observed hand gathering for winkles or shore crab.

Collection of crab comprises a small proportion of hand gathering activity with less than 10% of NIFCA sightings attributed to this activity. NIFCA have received reports that shore crab are difficult to

find on the rocky intertidal, with the best places being around staithes or under shelter on muddy intertidal habitats. In fact, many shore crab collectors will travel to the North West coast as collection is more efficient due to higher abundance of shore crabs found in intertidal areas there (Les Weller, pers. comms. 2020).

On the North East coast, hand gathering for shore crab is typically seasonal with crab targeted when soft shelled just after moulting, which takes place in late Spring and Summer. Therefore, collection occurs in a 3-4 month period from late May to August. There have been reports that some collectors will target shore crab year-round and will keep them until they moult and can be used effective bait. However, anecdotal evidence suggests this practice needs a sophisticated set up and is not common in the North East.

The collection of shore crabs from rocky intertidal areas will have similar impacts to hand gathering for periwinkles. Shore crab shelter under rocks or in crevices and so collectors will search these cryptic habitats turning rocks as they search.

A proportion of the collection of shore crab is carried out in estuaries using artificial shelters. It has been reported that 90% of the shore crab collected within the NIFCA district is collected using artificial shelters. This is thought to be a more efficient method of collection as the target species congregates within the shelter facilitating easier collection than searching and turning rocks on intertidal rocky shores. Artificial shelters, termed fisheries aggregation devices, are placed in areas of intertidal estuarine mud and are found both within Marine Protected Areas and outside of them in the Northumberland IFCA district. No fisheries aggregations devices are placed within Northumbria Coast SAC intertidal rocky reef supporting habitat. This activity therefore falls outside of the remit of this assessment, however assessments for this activity in the AIn Estuary MCZ (AIn MCZ – SRA 016) and Northumberland Marine SPA (NCSPA – tLSE 038) will be carried out.

**Due to the scale of the activity, it is unlikely that the collection of shore crabs from intertidal rocky reef will adversely impact the conservation objectives of these features (moderate confidence).**

#### **Hand gathering targeting periwinkle**

Hand gathering for periwinkle is carried out both commercially and recreationally on the Northumberland Coast. Commercial collectors sell periwinkle through two wholesalers in Berwick where they are exported to Europe, mainly to France where there is a large market. Wholesalers only take periwinkle above the minimum market size of 12 mm. At the wholesalers, periwinkle are put through a riddle which grades them by size into small, medium and large categories (small = 12-14mm, medium = 14-17mm, large = 17+mm). Wholesalers report that they return the discards to a suitable area of rocky shore through trusted collectors and fishers. Prices offered to gatherers varies but is usually around £1/kg for small, £2/kg for medium and £3/kg for large, this can increase to £5/kg for large size classes around Christmas. Commercial collectors will collect periwinkle by hand, as described above, into

'onion' sacks which hold around 25kg of periwinkle. Catch data is held by wholesalers, NIFCA plan to work with wholesalers who will share this information. This can be used in the Hand Gathering Monitoring and Control Plan to understand effort and the impact of the activity.

The activity has been reported to be higher in summer, with the most activity recorded in August (Tinlin McKenzie, 2018). Collection is higher over spring tides. On average, collectors carry out 5 trips per month, spending 3 hours collecting per trip. They collect, on average, 13.9 kg per trip (Tinlin McKenzie, 2018). For removal from the areas of Northumbria Coast SPA that fall into the BNNC SAC, the average periwinkle biomass removed per year is estimated to be 13,398.2 kg (Tinlin McKenzie, 2018).

NIFCA officers record sightings of intertidal hand work activity observed during routine patrols when a site visit coincides with low water ( $\pm 2$  hours). Between January 2016 and October 2021, 323 visits to handwork locations within Northumbria Coast SPA were made by officers. 129 observations were recorded of individuals hand gathering for winkles or shore crab. Given the lack of collection of shore crab as outlined above, for the purpose of this assessment these sightings have been classed as periwinkle collection sightings.

Areas where activity is known to occur in the NIFCA district has been classified as High, Medium and Low based on comparing collection pressure from the sightings data, which has been corroborated using the findings of Tinlin-McKenzie (2018) and from reports to NIFCA on activity (Annex 2). Classifications were split equally but checked to see if more natural breaks were more suitable, and against officers' knowledge. Within NC SPA, Seaton Point (south of Boulmer), Creswell, Cambois, and St Mary's Island have been categorised as high pressure (Annex 3). With the addition of information from Tinlin MacKenzie (2018) Seahouses and Newton have been classified as medium pressure although there are no sightings of collection at either area. This may be due to low patrol effort in these areas.

In comparison, periwinkle harvest levels described in Ireland and Scotland are estimated to be 4000 tonnes per year (McKay et al, 1997; Cummins et al., 2002). When equated by coastline area to the parts of the Northumberland Coast (that fall within the BNNC SAC – the area we have estimates for) the exploitation rates in Ireland and Scotland are approximately double the exploitation rates on the Northumberland Coast (25 tonnes and 13.4 tonnes respectively) (Tinlin McKenzie, 2018). This represents a smaller level of collection on the Northumberland Coast compared elsewhere in the UK, although this doesn't necessarily mean a smaller impact. NIFCA currently does not have any stock assessment information to fully understand the impacts of collection at any level on the population.

Periwinkle size was compared by Tinlin-McKenzie (2018) to previous studies (Morell 1976; Quigley, 1999). On the most heavily collected shore studied (Boulmer) the largest shell height had not decreased suggesting harvesting periwinkles had not led to a reduction in maximum shell height over the last 50 years. In other

areas of the UK, periwinkle size and density was found not to correlate to harvesting pressures at current exploitation levels (Tilin et al., 2010). Natural variation in density between shores is likely to have a greater impact than that of harvesting. With factors such as habitat selection likely to have a greater impact (Gendron, 1977). However, Quigley (1999) revealed differences in the size distributions and mean size of periwinkle between “collected” and “uncollected” populations within the BNNC SAC, and that the maximum size attained by *Littorina* on “collected” shores was smaller than that from “uncollected” suggesting that high levels of collection could have an impact on periwinkle size.

Densities on shores within the Northumberland Coast SAC have been found to vary based on collection pressure but with different directions of difference. Quigley (1999) found densities of periwinkle to be higher on two out three shores with ‘high’ collection rates when compared to adjacent shores with ‘low’ collection rates. Relatively high densities may have been sustained due to dispersive larval recruitment from other shores (Jackson, 2008) or refuge areas.

Crossthwaite (2012) found that long-term exploitation did significantly affect population abundance and age structure. However, exploitation levels are higher in these study areas, which are located in Northern Ireland. Local findings suggest that periwinkle populations are maintained at harvestable levels at highly collected shores and communities likely vary from natural variation, rather than harvesting effects (Tinlin-McKenzie, 2018).

Direct impacts of periwinkle collection to associated flora and fauna are due to:

- Physical damage to flora and fauna from disturbance (Berthelon et al., 2004) from boulder turning and trampling which can cause a reduction in habitat stability and reduced biodiversity (Davenport and Davenport, 2006). This can damage under-boulder communities which require stable boulder habitats. It can also adversely impact organisms that depend on upper rock surfaces, such as seaweeds (Liddard et al., 2011). Reduction in habitat stability from boulder turning can be lethal to fauna, algae, and under-boulder communities through crushing, smothering and desiccation (Berthelon et al., 2004).
- Reduction in species composition through trampling can reduce biodiversity, abundance, and biomass (JNCC and NE, 2011). It can lead to a higher percentage of bare rock with a decrease in algal cover (Tyler-Walters, 2008; Liddard et al., 2011). These effects can be seen at low trampling with long term impacts (Povey and Keough, 1991). These impacts are variable, dependent upon intensity, duration, and frequency of the trampling (JNCC and NE, 2011).
- These disturbances can negatively alter community structure, they vary spatially and temporally (Berthelon et al., 2004) and most severely impact long lived sedentary species that are slow to reproduce (Berthelon et al., 2004).

Although previous studies show direct impacts of rocky shore disturbance, the impacts can be difficult to predict locally. The local evidence available (Tinlin-McKenzie, 2018; Quigley, 1999)



suggests that periwinkle collection, at current levels, does not appear to be negatively impacting rocky shore floral and faunal communities in the ways described above. Natural England commissioned a study investigating the scale, locale, and ecological impacts of harvesting intertidal species including periwinkles (Tinlin-McKenzie, 2018). Three shores were observed representing 'not collected', 'low collection' and 'high collection'. Results found that periwinkle collection does not appear to be negatively impacting rocky shore floral and faunal communities at current intensity levels. Quigley (1999) reported that between shores in Northumberland with different collection pressures ('collected' and 'uncollected') two out of three sites showed no significant difference in non-target animal mean abundance.

Overall, periwinkle stocks appear to be relatively resilient to harvesting. As the local evidence available from peer reviewed research (Tinlin-McKenzie, 2018; Quigley, 1999) suggests the harvesting at current levels does not impact floral and faunal communities. However, literature from other areas of the UK suggest the most significant potential impacts appear to be on non-target rocky shore dwelling plants and animals which experience physical disturbance from human activities (Berthelon *et al.*, 2004; Crossthwaite, 2012). The hydrodynamics along the Northumberland Coast is variable, in more exposed areas wave and wind naturally turns some small boulders/cobbles. Thus, intertidal and infralittoral communities subject to this natural disturbance will be more resistant to disturbance pressures than communities in sheltered areas. Overall, the intertidal rocky reef feature is subject to naturally high levels of physical disturbance and recovery of rocky reef communities is predicted to be medium (Mieszkowska and Sugden, 2014). However, the impacts of boulder turning are more severe when boulders are left upturned (Davenport and Davenport, 2006; AFBI, 2009).

NIFCA can say with moderate confidence that on area of bedrock reef (i.e. not boulder/cobble reef), and on boulder/cobble reef areas where activity is medium or low this activity will not have an adverse impact on features of the site if boulders are returned to their original position. However, NIFCA have received multiple reports that activity has increased in certain areas since 2018. Further, evidence in the literature from other areas in the UK (Northern Ireland) (Crossthwaite *et al.*, 2012) suggest that the impact of removal of periwinkle at higher intensity levels of collection could have long term impacts to community composition and structure. Therefore, at areas of high collection, NIFCA are unsure whether this activity will significantly impact the conservation objectives of this feature, especially as there is no stock assessment information. Management could aim to ensure that collectors return all boulders to their original positions after use, or minimise boulder turning all together. This could be done using education, and codes of conduct (Boye *et al.*, 2006). Trampling may be too difficult to manage due to the free access of rocky shores to the public undertaking recreational activities.

**NIFCA conclude, with moderate confidence, that this activity will not adversely impact the conservation objectives of the site, through the pressures listed above, at areas of low and**

**medium collection. Areas classified as high collection will be taken to Appropriate Assessment.**

All hand gathering will continue to be monitored through routine and target patrols throughout the district. NIFCA plan to implement a Code of Conduct (Annex 4) for hand gathering for periwinkles in the district that aims to stop any adverse impacts from the activity including avoiding the collection of small (below minimum market size – 12 mm), reducing disturbance to floral and faunal communities and to birds. NIFCA will monitor adherence to this code of conduct, and if found it is not being adhered to, plan to develop management measures.

**Cleeking**

Cleeking is a low impact activity, those engaged in the activity walk over intertidal areas to reach the sea at low tide. The activity is highly seasonal, concentrated in summer months on big spring tides.

The main damage to the marine environment will result from individuals crossing the foreshore, however given the limited and declining levels of activity this is unlikely to cause any adverse impacts. Impacts could also occur when rocks are turned over and not replaced. The hydrodynamics along the Northumberland Coast is variable, in more exposed areas wave and wind naturally turns some small boulders/cobbles. Thus, intertidal and infralittoral communities subject to this natural disturbance will be more resistant to disturbance pressures than communities in sheltered areas. Overall, the intertidal rocky reef feature is subject to naturally high levels of physical disturbance and recovery of rocky reef communities is predicted to be medium (Mieszowska and Sugden, 2014). Plus, given the limited and declining levels of activity this is unlikely to cause any adverse impacts.

Activity is relatively low in areas of the Northumbria Coast SPA. There were 323 patrols to potential cleeking locations within NC SPA between January 2016 and October 2021 with cleeking seen on 33 of those patrols. 65 individuals were recorded cleeking. From these activity levels, effort is inferred to be low. The activity is labour intensive and anecdotally it is in decline as younger generations are not partaking in this traditional activity.

Further NIFCA byelaws limit the activity: NIFCA Byelaw 4 Crustacea Conservation limits the number of lobster that can be taken using this method to one per person per day.

At current declining levels, cleeking in the intertidal zone is unlikely to cause significant adverse impacts to the conservation objectives of this site through the pressures listed above.

**NIFCA conclude, with moderate confidence, that this activity will not adversely impact the conservation objectives of the site through the pressures listed above.**

<p><b>6. Condition and Conservation Objective Inferences</b></p>	<p>Conservation advice for the NCSPA gives a conservation objective of 'Maintain' for 'Intertidal rock'. To support designated bird features of the sites this should be maintained at 497.8 ha. The conservation advice also gives a 'Maintain' objective for intertidal stony reef, when combined with intertidal biogenic reef: mussel beds the area should be maintained at 35.9 ha.</p> <p>No evidence is available on the current condition of 'Intertidal bedrock reef' or 'Intertidal boulder and cobble reef' within the NCSPA.</p> <p>The activity detailed above is unlikely to impact the extent of intertidal rock or intertidal stony reef.</p>													
<p><b>7. Is the potential scale or magnitude of any effect likely to be significant?</b></p>	<p><b>Hand gathering for periwinkle and/or shore crab</b> <b>Alone:</b></p> <table border="1" data-bbox="630 663 1170 1108"> <thead> <tr> <th></th> <th>Bedrock Reef</th> <th>Intertidal boulder and cobble reef</th> </tr> </thead> <tbody> <tr> <td>Periwinkle collection</td> <td><b>No</b> (Low/medium collection areas) <b>Yes</b> (high collection areas)</td> <td><b>No</b> (Low/medium collection areas) <b>Yes</b> (high collection areas)</td> </tr> <tr> <td>Shore crab collection</td> <td><b>No</b></td> <td><b>No</b></td> </tr> <tr> <td>Cleeking</td> <td><b>No</b></td> <td><b>No</b></td> </tr> </tbody> </table>		Bedrock Reef	Intertidal boulder and cobble reef	Periwinkle collection	<b>No</b> (Low/medium collection areas) <b>Yes</b> (high collection areas)	<b>No</b> (Low/medium collection areas) <b>Yes</b> (high collection areas)	Shore crab collection	<b>No</b>	<b>No</b>	Cleeking	<b>No</b>	<b>No</b>	<p><b>OR In-combination</b></p> <p><b>No</b> in low/medium collection areas</p> <p><b>Uncertain</b> in high collection area. An incombination assessment will be carried out as part of an Appropriate Assessment.</p>
	Bedrock Reef	Intertidal boulder and cobble reef												
Periwinkle collection	<b>No</b> (Low/medium collection areas) <b>Yes</b> (high collection areas)	<b>No</b> (Low/medium collection areas) <b>Yes</b> (high collection areas)												
Shore crab collection	<b>No</b>	<b>No</b>												
Cleeking	<b>No</b>	<b>No</b>												
<p><b>8. Have NE been consulted on this LSE test? If yes, what was NE's advice?</b></p>	<p><b>Yes</b></p> <p>Synthesis of evidence and local knowledge informing this decision occurred between September 2018 and the date of this document's creation with stakeholders (where appropriate) and other statutory authorities. Natural England (CS) was involved with this informal process.</p>													

## Conclusion

### Is the proposal likely to have a significant effect 'alone or in combination' on the Northumberland Coast SPA?

For shore crab collection and cleeking, activities are not likely to have a significant effect 'alone or in combination' on the Bedrock reef or Intertidal boulder and cobble reef features of the NC SPA.

For periwinkle collection, in the areas of medium or low collection pressure periwinkle collection is not likely to have a significant effect 'alone or in combination' on the Bedrock reef or Intertidal boulder and cobble reef features of the NC SPA. NIFCA is uncertain about whether the activity will have an impact on areas of high collection pressure therefore NIFCA will conduct an Appropriate Assessment.

Effort will be monitored throughout the NIFCA district, and changes in effort in high, medium and low areas will be recorded following NIFCA's Hand Gathering monitoring and control plan, with management put in place, if appropriate.

**NCSPA – 282: Intertidal biogenic reef: mussel beds**

<p><b>1. Is the activity/activities directly connected with or necessary to the management of the site for nature conservation?</b></p>	<p>No</p>
<p><b>2. What pressures (such as abrasion, disturbance) are potentially exerted by the gear type(s)?</b></p> <p>Pressures listed are all those for which the feature is deemed to be sensitive. Pressures in bold are Medium-High Risk. The sensitivities listed are based on the 2018 conservation Advice available on Natural England's Designated Site System.</p>	<p><b>Abrasion/disturbance of the substrate on the surface of the seabed</b></p> <p><b>Habitat structure changes - removal of substratum (extraction)</b></p> <p><b>Penetration and/or disturbance of the substratum below the surface of the seabed, including abrasion</b></p> <p><b>Removal of non-target species</b></p> <p><b>Removal of target species</b></p>
<p><b>3. Is the feature potentially exposed to the pressure(s)?</b></p>	<p>Yes</p>
<p><b>4. What are the conservation objectives for the feature?</b></p>	<p>The conservation objectives for 'Intertidal' supporting habitat for designated bird feature(s) are set to:</p> <p><b>Maintain:</b></p> <ul style="list-style-type: none"> <li>• the extent, distribution and availability of suitable habitat: intertidal biogenic reef: mussel beds. This is both inside and outside of the designated site</li> <li>• <u>the distribution, abundance and availability of key food and prey items (e.g. Mytilus, Littorina, Nucella, kelp-fly larvae) at preferred sizes.</u></li> </ul> <p><b>Restrict:</b></p> <ul style="list-style-type: none"> <li>• <u>the frequency, duration and / or intensity of disturbance affecting roosting, foraging, feeding, moulting and/or loafing birds so that they are not significantly disturbed.</u></li> </ul> <p>The conservation objectives that might be affected by intertidal handwork activity are underlined.</p>

**5. What are the potential effects/impacts of the pressure(s) on the feature, taking into account the exposure level?**

The NCSPA boundary stretches sporadically along the Northumberland coastline from the river Tweed to Blackhall Rocks (NEIFCA district) (Annex 1) as the designated supporting habitat of rocky reef is not continuous.

The other sections of this document consider the following types of hand gathering activity: the collection of periwinkles or shore crab by hand and cleeking for lobster on the intertidal rocky areas (information about hand gathering for seaweed can also be found in the section above). **This section assesses all hand gathering activity from mussel beds.**

There is no formal definition of a mussel bed, under WFD, MSFD guidelines. A JNCC report describes a lack of a definitive definition but states: "mussel beds are biogenic reefs as they increase the structural complexity of the seafloor" (JNCC, 2014). The JNCC's working definition of biogenic reefs describes elevated, solid structures of a substantial size (a somewhat arbitrary extension of 1-2 metre across is given) and the community associated with them needs to be sufficiently distinct from that inhabiting the surrounding substratum. While this offers some description of a biogenic reef it is difficult to apply this on the ground without some analysis. OSPAR defines (threatened and declining) mussel beds as covering at least 30% of the underlying habitat.

Mussel beds can attach to a variety of substrata including algae on shores of pebbles, gravel, sand, mud and shell debris. If conditions are right, mussel beds can form, creating biogenic reefs. Mussel spat settles at various locations on the Northumberland Coast, however due to the dynamic nature of the coastline, spat gets washed away before forming a 'mussel bed'. There are formed mussel beds at Holy Island, Fenham Flats (both located within Lindisfarne National Nature Reserve LNNR) and on the Blyth Estuary. None of these established biogenic reefs geographically fall within the boundary of the Northumberland Coast SPA, however, may form roosting or feeding areas for the classified bird species protected by this site's designation (Purple Sandpiper and Turnstone) and so have been included in this assessment.

Mussels are collected for bait on the Northumberland Coast, this is reported to be both commercially and recreationally. There are no mussel beds collected commercially for food consumption in the NIFCA district.

Fenham Flats and Holy Island Sands mussel beds are located within Lindisfarne National Nature Reserve (LNNR). The LNNR has byelaws which prohibit the collection of organisms for bait, and therefore the collection of mussels for bait. Levels of mussel collection at beds within the LNNR are low since collection is a contravention of that byelaw. Fenham Flats is difficult to access which can further deter collection from this bed. The bed close to Holy Island is more accessible, however collection of mussel is reported to be low (Andrew Craggs, pers. comms.).

Mussel is collected for bait from beds in the Blyth Estuary. Between 2016 and 2020, 77 visits were made to the site two hours before or after low water, with 23 sightings of mussel collection activity. On average, mussel collectors (generally one or two individuals) are seen on one in four patrols representing moderate level of activity.

In 2014, NIFCA were notified of an increase in bait collection activity in the Blyth estuary, and a decline in the size and density of the mussel beds. In 2015, NIFCA started monitoring the beds and implemented a voluntary Code of Conduct for bait collection activities in the Blyth estuary, promoting sustainable practices. NIFCA surveys from 2018-20 indicate a decline in the number of mussels at the site in 2019-20 compared to 2018. Results indicate an ageing population with lower numbers of young mussel in 2019/20 compared to in 2018, although this trend needs to be confirmed. There is a high degree of variability in the estuary overall with separation in the areas of the mussel bed(s).

The decline in the mussel bed over time is not documented with the historical condition of the mussel beds is unknown; conversations with some stakeholders indicate a significant decline as early as the 1970/80s. Anecdotal declines in the mussel bed could be due to a variety of factors. In 1999, a new sewage treatment works were constructed at Cambois which runs approximately 1km out to sea before discharging. This greatly decreased the input of sewage to waters within the Blyth estuary. Sewage effluent contains a high level of particulate matter which is filtered out of the water column by many invertebrates and could have been an important part of the diet for mussels. In 1999, in the Blyth estuary, the proportion of organic particles originating from sewage effluent was found to be as high as 40% (Eaton, 1999). The removal of this nutrient input by improvement of the sewage treatment works could have caused a decrease in mussel populations (Eaton, 1999). Officers have spoken to collectors and other stakeholders on the estuary, one person perceived long term declines in mussels, as well as cockles and clam. He stated declines were partly due to dredging by vessels to remove shellfish in the 1970s. Hand gathering collection pressure may also be a factor in anecdotal declines, however further evidence is needed to confirm this. Northumberland IFCA aim to better evidence the amount of mussel collection activity on the Blyth. If collection pressure is unsustainable NIFCA will explore options for management on the basis of unsustainable exploitation of a fisheries resource.

However, impact of bait collection activity on purple sandpiper and turnstone food availability and disturbance are limited as these species do not use the estuary for feeding or roosting purposes or are present in very small numbers. Purple sandpiper are only found on the pier at Blyth at high tide and to the east of this at low tide so do not use the mussel beds in the estuary (pers. comms Lindsay McDougall, WeBS Blyth estuary counter). In early 2000s, turnstones were reported feeding on higher shore deposits of mussel in the Sleekburn (adjacent to the Blyth), on the south side near to the boat club, and further

up the estuary on both north and south banks. Recently, turnstone have been reported unlikely to use the mussels as a food source, they have a varied diet and in the Blyth are likely to eat insects, small crustaceans and molluscs and carrion e.g. dead fish (pers. comms, Lindsay McDougall). Counts of turnstone have a current five-year moving average of 13 individuals (Frost et al. 2020), which has declined slightly since the mid-1990s. There was a peak in counts in the early 1990s however prior to this counts were similar to present numbers (Annex 5, Fig 3a) so no long-term trends are detected. Counts of purple sandpiper on the Blyth Estuary have been zero from 2014 to present (Frost et al. 2020). Annual peak counts for purple sandpiper have historically been low at between 0-12 individuals with counts of above zero in only 5 years since 1983 (Annex 5, Fig 3b).

The nearby Northumberland Marine SPA stretches from Berwick to Blyth (and out to 12 nautical miles), and is designated to protect the feeding and resting areas of internationally significant populations of arctic, common, little, roseate and sandwich terns, puffins and guillemots. Only sandwich and common terns have been sighted in the WeBS counts in the Blyth estuary in any significant numbers, both of which have highly variable annual peak counts but general trends of a peak in the 1990s, lower counts in the early 2000s, followed by increases in more recent years (Annex 5, Fig 3c). Terns may visit the estuary to feed but do not eat mussel (their diet is mainly fish with some small crustaceans and annelids) so the mussel bed status is unlikely to impact their populations.

The Berwick to St Mary's MCZ is designated for common eider and covers the inshore waters near to the Blyth estuary. Eiders are some of the most abundant wildfowl in the estuary. Their numbers increased significantly in the 1980-90s and have remained relatively stable since (Annex 5, Fig 3d). Mussels can be a key part of the eider diet, for example they were found in the stomachs of 94% of birds examined wintering in the Firth of Forth (Player, 1971) so their success in the estuary may mean the mussel beds are capable of supporting their population.

Overall, peak counts for all bird groups in the estuary have changed over time. Gulls have decreased overall, with declines in black-headed, herring, common gulls and kittiwake (though increases in lesser black-backed gull). Waders (including purple sandpiper and turnstone) have decreased slightly overall however there is large variability between different species and between different years, with some species increasing. Wildfowl (geese, swans and ducks) have increased in the estuary over time, with increases in annual peak counts of eider, shelduck, mallard, red-breasted merganser, wigeon and notable recent increases in teal, gadwall and goosander, with no declines in any wildfowl species (Annex 5, Fig 3e). Of the 'other' birds counted, notable trends include a recent large increase in little egrets, and gradual increases in little grebe and moorhen.

Birds identified as using Blyth Estuary mussel as a food source are oystercatcher, curlew, herring gull and carrion crow (pers. comms, Lindsay McDougall). There are no data for crows but different trends in annual peak counts for the other species, with herring gull declining in the estuary over time, curlew increasing gradually, and numbers of oystercatcher varying over time with the highest counts in the early 1990s (Annex 5, Fig 3f). With no clear trends in these species, status of the mussel beds cannot be inferred.

Purple sandpiper predominantly forage on the rocky shore, feeding on a variety of marine invertebrates, mussels, winkles and dog whelks. Turnstone forage on the rocky shore as well as along sandy and muddy shores and feed on banks of washed up seaweed on the strand line as their diet is mainly composed of winkles, shrimps and barnacles. There is no evidence to suggest that prey availability is an issue for either species (Natural England DSS, 2020).

The hand gathering activities on the mussel bed at the Blyth Estuary have the potential to cause disturbance to bird species using the estuary for feeding or roosting purposes. Bird disturbance is considered one of the most serious impacts of bait collection in British estuaries over winter (Davidson and Rothwell, 1993). Disturbance leads to birds searching for new feeding areas, increasing energy expenditure and food competition, and ultimately increasing winter mortality rates in some cases (West et al., 2002; Masero et al., 2008). Lost feeding time due to disturbance can be compensated by extended feeding times or habituation to the presence of people (Urfi et al. 1996) however it is unlikely all species can compensate. Disturbance can influence breeding success through several factors e.g. nest abandonment, increased mortality of eggs due to predation and increased mortality of young through reduced feeding (Hockin et al. 1992).

Response to human disturbance differs between species. Golden Plovers (Smit & Visser 1993, Pearce-Higgins et al. 2007) and oystercatchers (Van Der Vliet et al 2010) for example are fairly tolerant, but Curlew and Redshank tend to take flight at more than twice as great a distance (Smit & Visser 1993). Response to human disturbance also differs in the same species between different places. As response to disturbance varies between species and location, it is not possible to give standard figures on flight distances caused by disturbance as these vary between sites and are dependent on earlier experiences in each particular location.

Purple sandpipers wintering in Hartlepool West Harbour declined two winters after re-development of the site probably caused by increased human disturbance (people, boats) (Burton et al 1996). Purple sandpipers have strong site-fidelity, putting them at greater risk of changes such as disturbance to wintering feeding areas (Mittelhauser et al., 2012). However, some studies show that this species has a low sensitivity to human disturbance. Purple sandpiper has been described as 'tends to be very confiding' and 'not so readily disturbed as other waders' (Brown & Grice, 2005). This species can also be



attracted to people including shellfish pickers on the beach (Bolam, 1912) and high levels of human activity around harbour walls and jetties (Prater, 1981). An SNH Report (Goodship & Furness, 2019) concluded that 'as purple sandpiper displays a high tolerance to human activity, the potential for disturbance at roost sites during hand-harvesting seaweed is low', although they noted there were no quantitative studies on purple sandpiper disturbance so this assessment had low confidence.

The report by Goodship & Furness (2019) assessed turnstones to have a higher (medium) sensitivity to disturbance than purple sandpiper, with more quantitative evidence showing a maximum Flight Initiation Distance (FID) of 100m during the nonbreeding season (with mean FID ranging from 12.5-31.5m), concluding 'this species has the potential to be disturbed on foraging and roosting grounds whilst hand-harvesting seaweed during the nonbreeding season'. This species is not particularly nervous compared to other wader species, allowing a closer approach than other species (Woodward et al., 2015). For example, one study found a FID of 31.5m for turnstone compared to 80m for redshank and 132m for grey plover (Collop et al., 2016). Within Northumberland, Quigley (1999) observed no effect of periwinkle harvesting on the three most common bird species on rocky shores (Dunlins, Turnstones, and Grey Plover), with generally higher abundances at the collected sites.

A recent study by Whittingham et al. (2019) on turnstone disturbance in the Northumbria Coast SPA found that turnstone densities were higher on sites at, or closer to, offshore refuges compared to mainland sites, while there were declines over time in turnstone counts in sites within the SPA which were exposed to greater human disturbance. Turnstone density (birds per hectare of suitable habitat) was higher the closer each site was to the nearest offshore refuge, and counts were stable at the two refuge sites. However, no relationship was found between the mainland counts and measures of human population density. Though this study focused on recreational use of the coast, not bait collection, it does highlight the vulnerability of turnstone populations within the Northumbria Coast SPA to human disturbance.

Bait collection on the Blyth Estuary occurs over 2-3 hours at low water when a greater extent of the mussel bed is uncovered. Bird species are more vulnerable to disturbance at high tide roosts where space is limited (Rogers et al. 2006) compared to low tide when there is a greater extent of the intertidal area available. Purple sandpiper and turnstone feeding and roosting habits are described above. Their use of the mussel bed in the estuary for foraging is limited, and their roosting sites are not close enough to the bed for them to experience disturbance from any hand gathering activity. Purple sandpiper roost on the piers in Blyth Harbour over 2km from the eastern extent of the mussel bed, this is unusual as in other places the birds will roost at high tide on the upper shore left exposed at high tide but due to infrastructure on the Blyth this habitat is not present (Eaton, 1999). Roosting turnstone

	<p>could potentially be more prone to disturbance than feeding birds, because of the wasted energy associated with flying over the high-tide period or relocating to an alternative roost site (Whittingham et al., 2019). Turnstones roost on the staithes (Eaton, 1999) and are unlikely to be disturbed by hand gathering activity on the mussel bed as the activity occurs over low water, with activity ceasing as the tide comes in making the mussel bed inaccessible.</p> <p>The presence of bait collectors is unlikely to be causing significant disturbance to estuarine bird species on the Blyth Estuary because they largely don't use them. The average number of collectors at any one time on a good low tide is one to two people. Other bird species outside the scope of this assessment may be affected by activities on the mussel beds. However, correspondence with a member of the Northumberland and North Tyneside Bird Club suggests that disturbance of most species using the estuary is minimal due to the low numbers of collectors present and the scale of the estuary at low water (Lyndsay McDougall, pers. comms.). Blyth mussel beds may be impacted by collection activities and Northumberland IFCA is monitoring this activity as part of its remit outlined under s153 of the Marine and Coastal Access Act.</p> <p><b>NIFCA conclude, with moderate confidence, that this activity will not adversely impact the conservation objectives of the site through the pressures listed above.</b></p>	
<p><b>6. Condition and Conservation Objective Inferences</b></p>	<p>Intertidal stony reef and Intertidal biogenic reef: mussel beds (35.9 ha). Northumberland IFCA carry out annual monitoring surveys on the following mussel beds: Blyth Estuary, Holy Island Sands and Fenham Flats.</p> <p>Survey results indicate that mussel bed area is relatively stable on all three beds (Blyth Estuary: 2.6 ha, Holy Island Sands: 4.0 ha, Fenham Flats: 53.7 ha). However, mussel density is decreasing, and length frequency analysis shows a skew towards larger sizes classes (45 + mm) across all beds.</p>	
<p><b>7. Is the potential scale or magnitude of any effect likely to be significant?</b></p>	<p><b>Alone:</b> <b>No</b></p>	<p><b>OR In-combination</b> <b>No</b></p> <p>An in-combination assessment will be carried out as part of the Appropriate Assessment.</p>
<p><b>8. Have NE been consulted on this LSE test? If yes, what was NE's advice?</b></p>	<p><b>Yes</b></p> <p>Synthesis of evidence and local knowledge informing this decision occurred between September 2018 and the date of this document's creation with stakeholders (where appropriate) and other statutory authorities. Natural England (CS) was involved with this informal process.</p>	

**Conclusion**

**Is the proposal likely to have a significant effect 'alone or in combination' on the Northumberland Coast SPA?**

No, the protected birds of the NC SPA, Purple Sandpiper and Turnstone, do not prosecute the mussel beds therefore confidence is high. Other protected bird species may be impacted by collection activity on mussel beds. Northumbria Coast Ramsar site species include Purple Sandpiper, Turnstone, and Little Tern, mussel collection activity is unlikely to have a significant impact, these species do not prosecute the mussel beds, therefore confidence is also high. Impacts to Eiders are currently unknown, an MCZ Assessment will be carried out as part of the assessment process for Berwick to St Mary’s MCZ to which this assessment will provide information. Other anthropogenic activities occurring on mussel beds are limited.

In the area mussel beds, which are supporting habitats, are subject to decline. Declines are monitored through NIFCA annual monitoring surveys (Harvey, 2021). Declines observed may be linked to fishing impacts however, other factors such as water quality may also impact mussel bed health. In other parts of the NIFCA district hand gathering on the mussels does not occur (however, these populations are also declining).

**NCSPA – 265: Estuarine Birds**

The Northumbria Coast SPA was classified in 2000, at the time of designation qualifying features were under Article 4.1 of the EC Birds Directive because it supported 1.7% of the GB population of breeding little tern listed in Annex I of the Directive and under Article 4.2 of the Directive because it supported two regularly occurring migratory species: 2.6% of the biogeographic population of turnstone and 1.6% biogeographic population of purple sandpiper. (The title of legislation has since been updated as the Birds Directive has been transposed into UK law following EU Exit). The inter-tidal rock platform and strandline of sandy beaches form an important resource for species classified as estuarine birds: purple sandpiper and turnstone.

<b>1. Is the activity/activities directly connected with or necessary to the management of the site for nature conservation?</b>	No
<b>2. What pressures (such as abrasion, disturbance) are potentially exerted by the gear type(s)?</b>	<p><b>Removal of non-target species</b></p> <p><b>Visual disturbance</b></p> <p>Above water noise</p> <p>Collision ABOVE water with static or moving objects not naturally found in the marine environment (e.g., boats, machinery, and structures</p> <p>Introduction of light</p> <p>Transition elements &amp; organo-metal (e.g. TBT) contamination</p>
<b>3. Is the feature potentially exposed to the pressure(s)?</b>	Yes

#### 4. What are the conservation objectives for the feature?

Expert judgement has been used to determine which features may be exposed to the pressure(s) resulting in inferred COs. These COs are assigned a degree of uncertainty i.e. a subjective confidence level based on evidence 'High', 'Medium,' 'Low', and 'Unknown'.

The conservation objectives for designated estuarine bird feature(s) are set to:

##### Maintain:

- safe passage of birds moving between roosting and feeding areas.
- concentrations and deposition of air pollutants
- the structure, function and supporting processes associated with the feature and its supporting habitat through management or other measures (whether within and/or outside the site boundary as appropriate) and ensure these measures are not being undermined or compromised.
- the extent, distribution and availability of suitable habitat (either within or outside the site boundary) which supports the feature for all necessary stages of the non-breeding/wintering period (moulting, roosting, loafing, feeding)
- the distribution, abundance and availability of key food and prey items (eg. *Balanus*, *Mytilus*, *Carcinus*, *Gammarus*, *Littorina*, dipertan flies, kelp-fly larvae) at preferred sizes.
- the area of open and unobstructed terrain around roosting and feeding sites.
- a vegetation structure of key roost sites dominated by bare ground or a short sparsely-vegetated sward.
- the dissolved oxygen (DO) concentration at levels equating to High Ecological Status (specifically  $\geq 5.7$  mg L<sup>-1</sup> (at 35 salinity) for 95 % of year), avoiding deterioration from existing levels.
- water quality at mean winter dissolved inorganic nitrogen levels where biological indicators of eutrophication (opportunistic macroalgal and phytoplankton blooms) do not affect the integrity of the site and features, avoiding deterioration from existing levels.
- natural levels of turbidity (e.g. concentrations of suspended sediment, plankton and other material) across the habitat.

##### Restrict/restore/reduce:

- the frequency, duration and / or intensity of disturbance affecting roosting, foraging, feeding, moulting and/or loafing birds so that they are not significantly disturbed.
- the size of the non-breeding population, whilst avoiding deterioration from its current level as indicated by the latest mean peak count or equivalent.
- aqueous contaminants to levels equating to High Status according to Annex VIII and Good Status according to Annex X of the Water Framework Directive, avoiding deterioration from existing levels.

The conservation objectives that might be affected by intertidal handwork activity are underlined.

**5. What are the potential effects/impacts of the pressure(s) on the feature, taking into account the exposure level?**

The protected estuarine bird species of Northumberland Coast SPA are turnstone (*Arenaria interpres*) and purple sandpiper (*Calidris maritima*). Nationally, turnstone and purple sandpiper populations are experiencing long-term declines. The declines reported within the SPA is likely to reflect broadscale populations trends rather than any site-specific issues as population trends within the site broadly follow national trends (WeBS, 2020).

**Hand gathering for periwinkles and shore crab**

On the North East coast, hand gathering for shore crab is typically seasonal with crab targeted when soft shelled just after moulting, which takes place in late Spring and Summer. Therefore, collection occurs in a 3-4 month period from late May to August. There have been reports that some collectors will target shore crab year-round and will keep them until they moult and can be used effective bait. However, anecdotal evidence suggests this practice needs a sophisticated set up and is not common in the North East.

Collection of crab comprises a small proportion of hand gathering activity with less than 10% of NIFCA sightings attributed to this activity. NIFCA have received reports that shore crab are difficult to find on the rocky intertidal, with the best places being around staithees or under shelter on muddy intertidal habitats. In fact, many shore crab collectors will travel to the North West coast as collection is more efficient due to higher abundance of shore crabs found in intertidal areas there (Les Weller, pers. comms. 2020).

A proportion of the collection of shore crab is carried out in estuaries using artificial shelters. It has been reported that 90% of the shore crab collected within the NIFCA district is collected using artificial shelters. This is thought to be a more efficient method of collection as the target species congregates within the shelter facilitating easier collection than searching and turning rocks. Artificial shelters are placed in areas of intertidal estuarine mud and are found within Marine Protected Areas and outside of them in the Northumberland IFCA district. No artificial shelters are placed within Northumbria Coast SAC. This activity falls outside of the remit of this assessment, however assessments for this activity in the Aln Estuary MCZ (Aln MCZ – SRA 016) and Northumberland Marine SPA (NCSPA – tLSE 038) are in draft.

Turnstone and Purple Sandpiper are overwintering species. The key months for turnstone on the Northumberland coast are August-May and for Purple Sandpiper are October to April. It is unlikely that gathering for shore crab will occur during the peak periods when the overwintering birds are present, and periods of overlap in the spring and autumn will occur at times when disturbance effects are unlikely to have significant energetic consequences, due to warmer ambient temperature and plentiful prey. Therefore, the protected species are unlikely to be subject to significant disturbance from this activity. Further, gatherers target medium sized shore crab as it is cut up into different parts and used as bait for angling. This

differs from the preferred prey size of estuarine birds, which target small or juvenile crab (Harris, 1979).

**Given the small amount shore crab collection activity NIFCA conclude, with moderate confidence, that this activity will not adversely impact the conservation objectives of the site through the pressures listed above.**

Hand gathering for periwinkle has been reported to be higher in summer, with August the highest collection month (Tinlin McKenzie, 2018). Collection is higher over spring tides. On average, collectors carry out 5 trips per month, spending 3 hours collecting per trip. They collect 13.9 kg per trip on average. For removal from the areas of Northumbria Coast SPA that fall into the BNNC SAC, the average periwinkle biomass removal per year is 13,398.2kg (Tinlin McKenzie, 2018). Areas where activity is known to occur in the NIFCA district has been classified as High, Moderate and Low based on comparing collection pressure from the sightings data which has been corroborated using the findings of Tinlin-McKenzie (2018) and from reports to NIFCA on activity (Annex 2). See above Test of Likely Significant Effect table for further details on periwinkle gathering levels.

In comparison to periwinkle harvest levels described in Ireland and Scotland at 4000 tonnes per year (McKay et al, 1997; Cummins et al., 2002), the areas of the Northumberland Coast SAC that falls inside the BNNC SAC would have an estimated 25 tonnes when equated by coastline which is around double the latest estimate of removal (13.4 tonnes) (Tinlin McKenzie, 2018). This represents a smaller level of collection on the Northumberland Coast compared elsewhere in the UK, although this doesn't necessarily mean a smaller impact. We do not currently have any stock assessment information to fully understand the impacts of collection at any level on the population.

As described above, periwinkle are targeted commercially and recreationally within the Northumberland Coast SPA. Periwinkle also form a component part of the diets of estuarine birds. The diet of turnstones is extremely diverse ranging from coastal invertebrates to small fish, carrion, human garbage, and unattended eggs of other avian species (Nettleship, 2000). It includes molluscs, crustaceans and insects, with winkles, shrimps and barnacles all forming important parts of the species diet (Harris 1979). They feed on seaweed covered rocks, congregating at high tide to roost on the mainland shore or continue to feed on banks of washed up seaweed on the strand line. Turnstones have been observed changing their food preference depending on the availability of food, for example feeding on dipterans in the strand line at high tide, then amphipods as the tide goes out (Harris, 1979). Given the varied diet of turnstones, with periwinkles reported to be a small proportion (Harris, 1979), it is unlikely that the collection on periwinkles will significantly impact turnstone food availability.

The purple sandpiper's diet is less varied almost entirely restricted to rocky shore species (Feare, 1996). Analysis of the gut contents from eastern and northern Scotland showed that most of the diet at low tide consisted of molluscs, particularly littorinids (winkles), but also *Mytilus edulis* (mussels), *Nucella lapillus* (dog-whelks) and *Rissoa interrupta*. Crustaceans, annelids and algae are also eaten (Summers et al., 1990). The importance of periwinkle in their diet has been observed around the UK (Feare 1966; McKee, 1982) with very small sizes preferred. Dierschke (1993) found that the largest shell height found in purple sandpiper stomach contents was 3mm. This is significantly smaller than the size targeted by hand gatherers (12mm minimum market size). Given the disparity in preferred sizes between purple sandpiper and periwinkle gatherers it is unlikely that the collection of periwinkles will significantly impact purple sandpiper food availability.

Local evidence suggests that periwinkle gathering, at current levels, does not affect periwinkle abundance (Quigley, 1999). Densities of periwinkles on shores within the Northumberland Coast SAC have been found to vary based on collection pressure but with different directions of difference. Quigley (1999) found densities of periwinkle to be higher on 2 out of 3 shores with 'high' collection rates when compared to adjacent shores with 'low' collection rates. Relatively high densities may have been sustained in areas of higher collection pressure due to dispersive larval recruitment from other shores (Jackson, 2008) or refuge areas. Therefore, collection pressure may have a smaller impact on prey availability for classified bird species.

Given the nature of this activity, it has the potential to cause disturbance to roosting or feeding birds. Collectors are present on the shore for an average of 2-3 hours over low water (Tinlin McKenzie, 2018), therefore will only impact on the feeding activity carried out over this period and should not impact birds as they roost, or feed, at high tide.

Further, the species within the estuarine bird feature are overwintering. Turnstones overwinter from August until May; purple sandpiper overwinters from September until April. Periwinkle collectors are most active in the summer, with July, August and September the most collected months (Tinlin-MacKenzie, 2018). Peak periwinkle gathering activity does not correspond with peak periods when the overwintering birds are present, and periods of overlap in the spring and autumn will occur at times when disturbance effects are unlikely to have significant energetic consequences, due to warmer ambient temperature and plentiful prey. Therefore, the protected species are unlikely to be subject to significant disturbance from this activity.

Periwinkle collection is limited by tides and collection only occurs over low water on larger tides during the day, therefore the window for disturbance is limited. Also, the number of people collecting at any one time is low, maximum number recorded by Tinlin-McKenzie (2018) during the peak summer months was 13 (this was recorded in a 'high' collection area

(Boulmer) in the peak collection period (August). However, during the winter months when conditions are worse if birds experience lack of prey or cold temperatures, disturbance to feeding or roosting birds could cause increased energetic expenditure, when conditions are poor any disturbance could have severe impacts.

**Due to the limitations to the activity, the temporal difference in peak periwinkle collection and the overwintering period and the limited number of people engaged in this activity NIFCA conclude, with moderate confidence, that this activity will not have a significant adverse impact on estuarine birds.**

**Cleeking**

Activity is relatively low in areas of the Northumbria Coast SPA, with 38 sightings from 2014-2018. Anecdotally, the activity is in decline as younger generations are not partaking in this traditional activity.

It is unlikely that cleeking will occur during the peak periods when the overwintering birds are present, and any periods of overlap in the spring and autumn will occur at times when disturbance effects are unlikely to have significant energetic consequences, due to warmer ambient temperature and plentiful prey. Therefore, the protected species are unlikely to be subject to significant disturbance from this activity.

**NIFCA conclude, with high confidence, that this activity will not adversely impact the conservation objectives of the site through the pressures listed above.**



<p><b>6. Condition and Conservation Objective Inferences</b></p>	<p>No information on the condition of the Northumbria Coast features is available on Natural England's Designated Site System.</p> <p>The conservation advice is to 'Restore' the size of the non-breeding population of both turnstone (<i>Arenaria interpres</i>) and purple sandpiper (<i>Calidris maritima</i>).</p> <p>For turnstone, conservation advice is to 'Restore' the size of the non-breeding population to a level which is above 1,739, which was the population of turnstone at classification in 2000 (<a href="#">Natural England (NE), 2015</a>). The SPA population has since decreased to 681 (5-year peak mean 2011-2016), one of the reasons cited for this is recreational disturbance. Nationally, turnstone populations are experiencing long-term declines. The turnstone decline within the SPA may be likely to reflect broadscale populations trends rather than any site-specific issues (WeBS, 2020). However, the declines in counts of Turnstone from sites within the Northumbrian coast could be driven by a range of factors, such as changes in food abundance/availability (Burton et al. 2005, Burton &amp; Goddard 2006) or climate change which has altered temperatures during the winter over recent decades across the east Atlantic flyway (Austin &amp; Rehfish 2005, Mieszkowska et al. 2006, Pearce-Higgins &amp; Holt 2013). A recent study by Whittingham et al. (2020) on turnstone disturbance in the Northumbria Coast SPA found that turnstone densities were higher on sites at, or closer to, offshore refuges compared to mainland sites, while there were declines in turnstone counts in sites within the SPA which were exposed to greater human disturbance. This suggest disturbance events through human activity could be related to changes in turnstone behaviour with potential negative impacts. While the above explains this feature is not negatively impacted through handwork alone, the in combination assessment will explore the cumulative impact of other human activities including for recreation.</p> <p>For purple sandpiper, conservation advice is to 'Restore' the size of the non-breeding population to a level which is above 787, which was the size of the population at classification in 2000 (<a href="#">Natural England (NE), 2015</a>). The SPA population has since decreased to 242 (5-year peak mean 2011-2016). Nationally, purple sandpiper populations are experiencing long-term declines. UK declines and distribution changes of wintering Purple Sandpiper are consistent with shifts towards breeding grounds in northern Scandinavia (Frost et al., 2020). The purple sandpiper decline within the SPA is likely to reflect broadscale populations trends rather than any site-specific issues (WeBS, 2020).</p>
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<p><b>7. Is the potential scale or magnitude of any effect likely to be significant?</b></p>	<p>Alone:  No, moderate confidence that purple sandpiper and turnstone are not significantly impacted by hand gathering.</p>	<p>OR In-combination  No, for purple sandpiper.  For turnstone, human disturbance may be a factor for regional declines. This cannot be attributed to any one activity (Annex 6).</p>
<p><b>8. Have NE been consulted on this LSE test? If yes, what was NE's advice?</b></p>	<p><b>Yes</b>  Synthesis of evidence and local knowledge informing this decision occurred between September 2018 and the date of this document's creation with stakeholders (where appropriate) and other statutory authorities. Natural England (CS) was involved with this informal process.</p>	

## Conclusion

### Is the proposal likely to have a significant effect 'alone or in combination' on the Northumberland Coast SPA?

No, for shore crab collection and cleeking, based on the limited amount of activity this is unlikely to have a significant effect 'alone or in combination' on Estuarine bird features of the NC SPA. Therefore NIFCA has high confidence in this conclusion.

No, for periwinkle collection. Turnstone diet is diverse and therefore unlikely to be affected through food availability/resource competition, purple sandpiper diet is less diverse however both species prefer smaller sized periwinkle to those collectors with areas 'restocked' from less collected shores. Disturbance is unlikely to significantly impact either species as activity is limited to low tide, there is a greater area of shore available and numbers of people collecting at any one time are low. Further these species are overwintering birds, and collection pressure is highest in the summer months. Given these inferences, NIFCA has moderate confidence in this conclusion.

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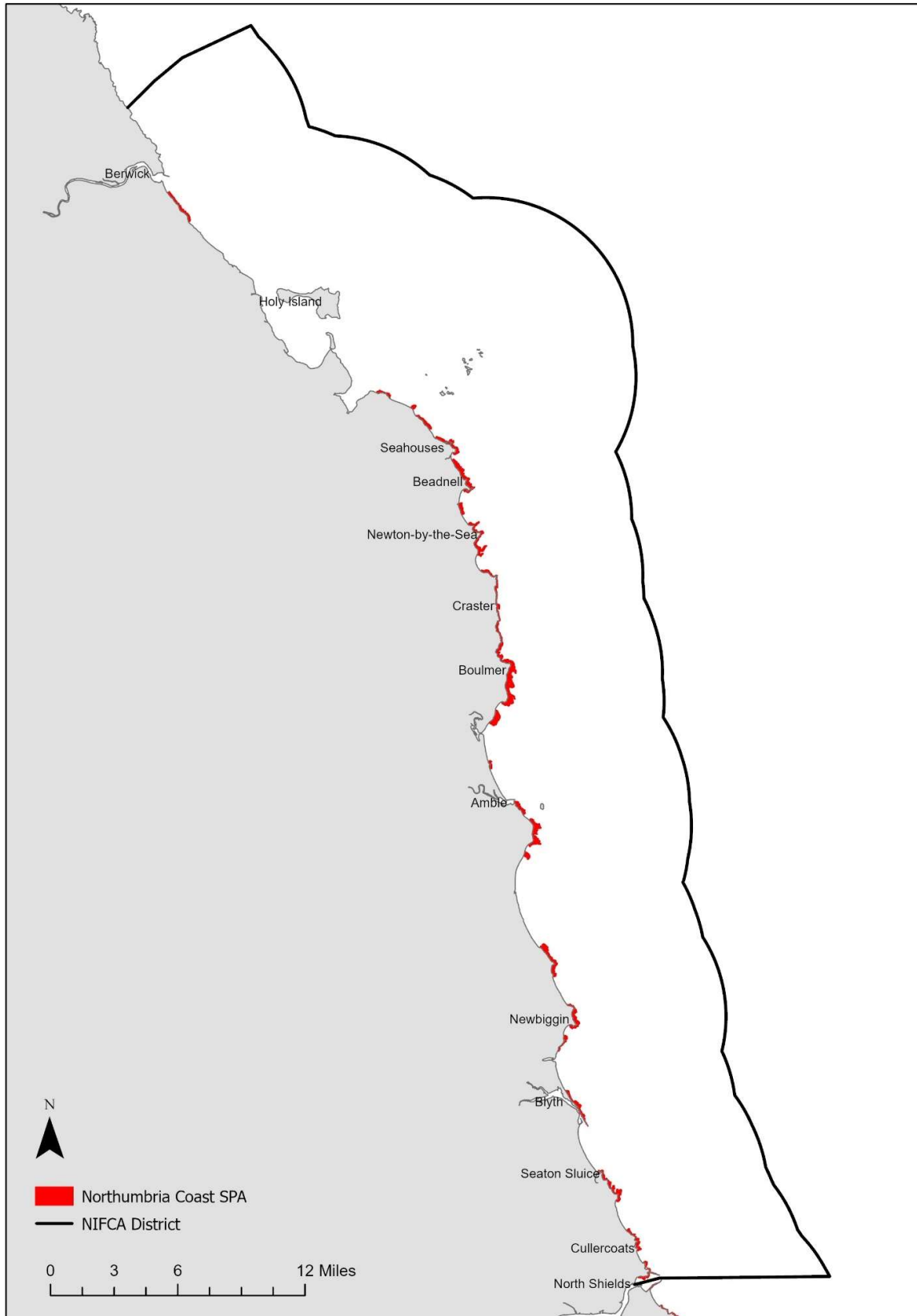
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# Annex 1

Figure 1 Northumbria Coast SPA map



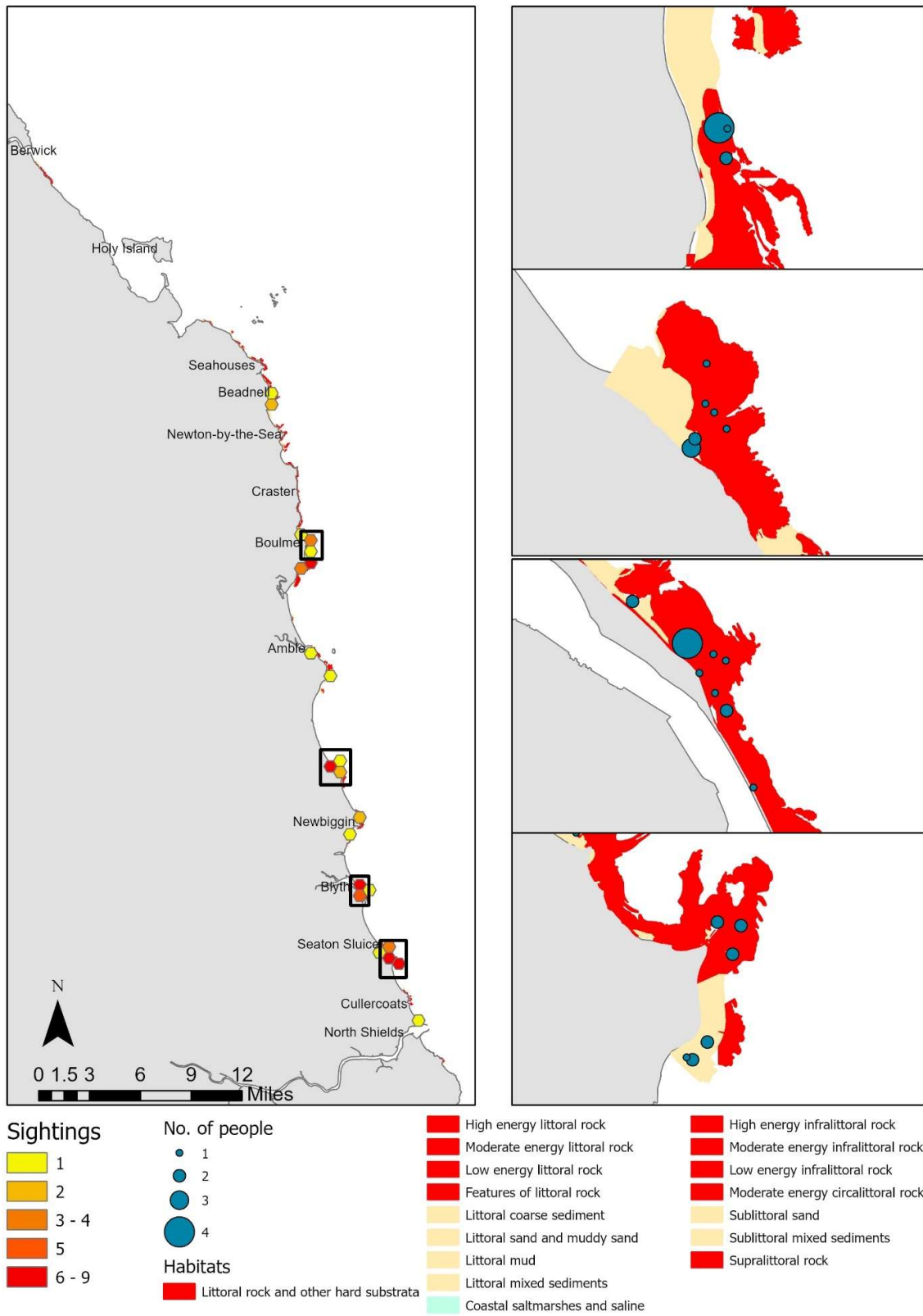
## Annex 2

Periwinkle gathering activity classifications for all sites within the NCSPA from NIFCA intertidal patrols between 2016 and October 2021. Showing total number of patrols, the proportion of patrols periwinkle collection was sighted on, the average number of individuals per sighting, the average number of individuals per patrol (proportion of patrols x average number per sighting) and the maximum number of collectors sighted at one time. Periwinkle activity rankings (Low – High) were based on average number of collectors per patrol to the area from NIFCA patrols, in addition to officer knowledge. Further to these sightings Seahouses and Newton have been identified as medium areas of collection intensity (Tinlin-MacKenzie, 2018). There have been no sightings in these areas during NIFCA patrols, these sites will be prioritised for NIFCA patrols in the future.

NC SPA	No of patrols	Proportion patrols	Average individuals/sighting	Average individuals/patrol	Max. no individuals at one time	Collection intensity
Amble	13	0.08	1.00	0.077	1	Low
Beadnell	21	0.19	1.75	0.333	2	Medium
Boulmer N	50	0.12	2.14	0.257	4	Medium
Cambois	28	0.46	1.57	0.730	4	High
Cresswell	25	0.32	1.67	0.533	4	High
Hauxley	16	0.06	1.00	0.063	1	Low
Newbiggin	20	0.10	1.50	0.150	2	Medium
North Shields	23	0.04	1.00	0.043	1	Low
Seaton Point	9	0.67	3.00	2.000	4	High
Seaton Sluice	48	0.17	1.60	0.267	4	Medium
St Mary's	43	0.26	2.36	0.605	4	High
Tynemouth	7	0.14	1.00	0.143	1	Medium
Whitley Bay	45	0.04	1.50	0.067	2	Low

### Annex 3

Number of periwinkle collection sightings within the NC SPA from NIFCA patrols from 2016-2020 showing sighting hotspots at Boulmer (Seaton Point), Cresswell, Cambois, and St Mary's Island on rocky intertidal habitats.





## Annex 4

Figure 2 Northumberland IFCA Code of Conduct for periwinkle gatherers.



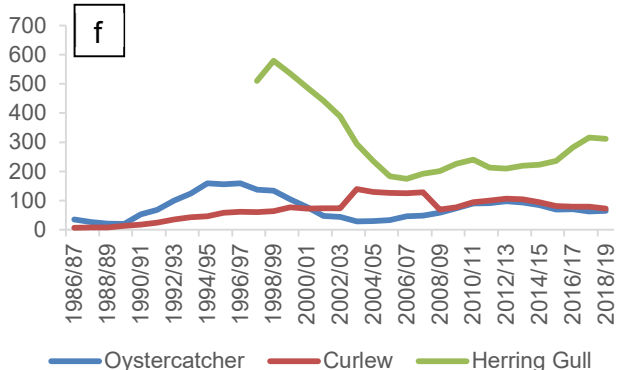
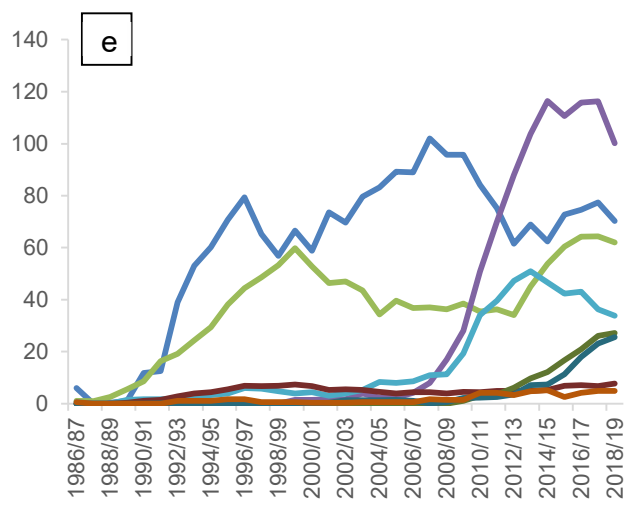
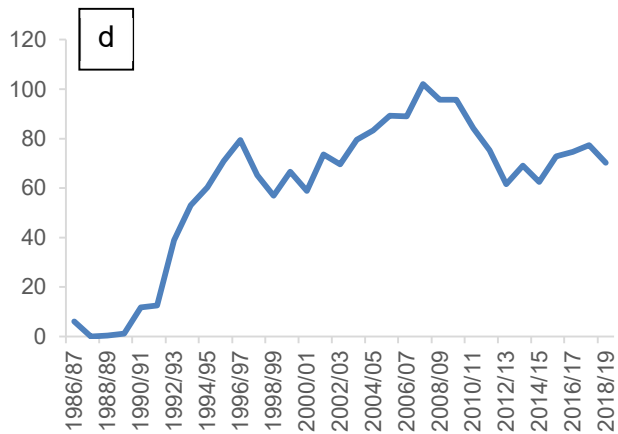
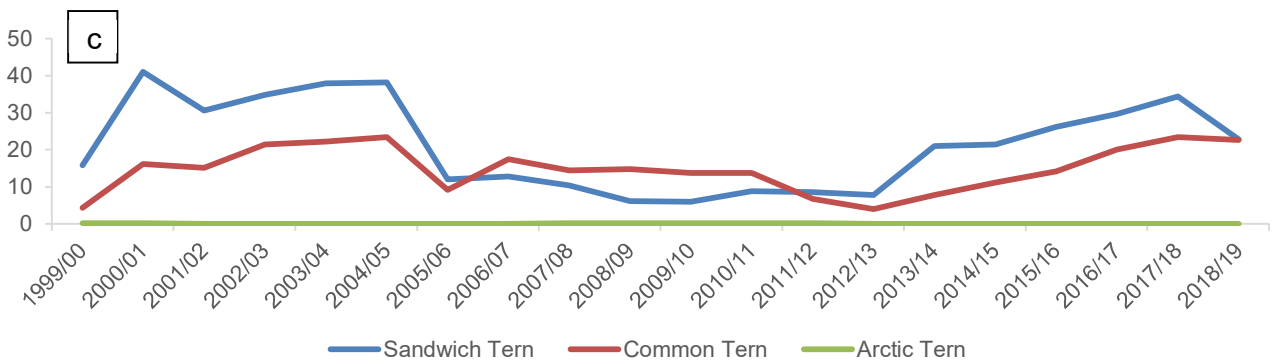
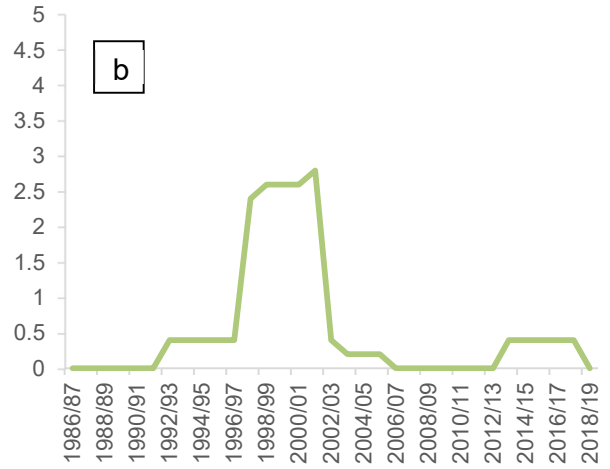
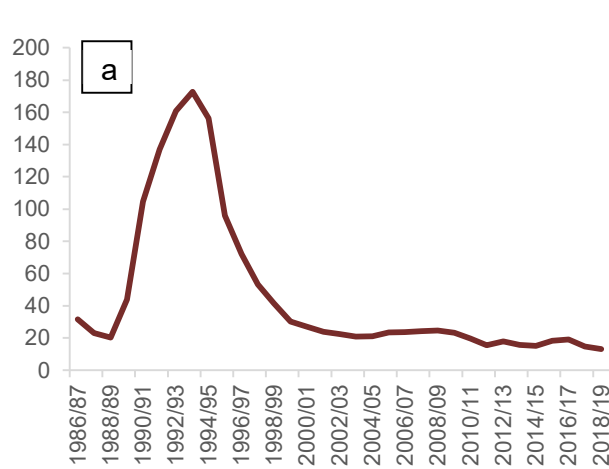
### Northumberland IFCA Periwinkle Gathering Code of Conduct

<p><b>PURPOSE</b></p>	<p>Collecting periwinkles in large numbers has the potential to damage seaweed and animals found on the rocky shore. Bird life can also be harmed by taking their food resources and causing disturbance.</p> <p>To reduce these impacts <b>the guidelines listed below should be followed</b> by any person removing periwinkles. These guidelines apply to the coastline from the River Tyne to the Scottish border.</p>
<p><b>GUIDELINES</b></p> 	<ol style="list-style-type: none"> <li>1. Do not create unnecessary disturbance:             <ul style="list-style-type: none"> <li>• rocks that are moved to search for or collect periwinkles should be replaced,</li> <li>• Care should be taken not to damage or displace any living organism.</li> <li>• Avoid bird disturbance in important feeding and resting areas.</li> </ul> </li> <li>2. Only collect periwinkles above 12 mm (minimum size taken by local wholesalers) to avoid taking juvenile periwinkles.</li> <li>3. Sort out and return small periwinkles (under 12mm) as close as possible to area of collection. Northumberland IFCA recommends using a sieve or riddle constructed of rigid mesh or bars spaced at least 12 mm apart to separate out smaller winkles.</li> <li>4. Periwinkles should be measured across the height of the shell from tip to tip (see diagram).</li> <li>5. Only collect edible periwinkles and no other similar looking species (see guide below).</li> </ol>
<p><b>EDIBLE PERIWINKLE GUIDE</b></p>	<p>Periwinkles are usually black/ dark grey-brown in colour with a white interior around the mouth</p> <p>They are usually around 2-3 cm high</p> <p>They have a smooth or slightly ribbed shell which extends to a pointed tip.</p> 
<p><b>Northumberland IFCA will monitor the collection of periwinkles to check whether the points listed above are followed. If they are not, this may result in the application of statutory measures.</b></p>	



### Annex 5

Blyth Estuary bird counts. Five-year moving average of peak counts of species on the Blyth Estuary (x-axis). Count data taken from WeBS (Frost et al. 2020) a) Turnstone, b) Purple sandpiper, c) Tern species, d) Eider, e) wildfowl species, f) Herring gull, Oystercatcher and Curlew (species using mussel as a food resource)



- Eider
- Shelduck
- Teal
- Mallard
- Red-breasted Merganser
- Gadwall
- Goosander
- Wigeon

## Annex 6 In combination assessment

This is an in-combination assessment for shore crab collection, cleeking, and periwinkle collection in low and moderate activity areas. Another in-combination assessment will be carried out for area of high collection pressure as part of an Appropriate Assessment.

<b>Plans and Projects</b>			
<b>Activity</b>	<b>Description</b>	<b>Assessment</b>	<b>Potential Pressure</b>
Fishing	<p>Potting</p> <p>In 2016 NIFCA introduced a recreational potting permit which will enable NIFCA to monitor levels of recreational potting within the district. Each permit holders is permitted to fish up to 5 pots within the NIFCA district and can only take 2 lobster (5 brown or velvet crabs, 20 whelks or 5 prawns) per day. In 2019 there were 204 recreational permit holders</p>	<p>A significant proportion of recreational pots are fished within the infralittoral zone from the shore with little overlap with into the intertidal. Recreational potting is often seasonal and carried out infrequently. Activities are unlikely to co-occur on reef features.</p>	<p>Recreational potting occurs on rocky infralittoral areas throughout the SPA. This activity is small scale in comparison to commercial potting activity. In 2019, NIFCA had 204 registered recreational potting permit holders, as each permit holder is only allowed a maximum of 5 pots this results in a total of 1,020 pots.</p> <p>Cleeking is likely to occur in a similar location to recreational potting, however activity is very low level.</p> <p>The vast majority of commercial potting will not be co-located with the activities assessed here.</p>
Fishing	<p>Bait digging</p> <p>Bait digging occurs on areas of intertidal soft sediment throughout the NIFCA district and inside the NC SPA. Activity peaks in winter months with worms a popular bait for winter fish for anglers such as cod.</p>	<p>Peak hand gathering and periwinkle collection and peak bait digging season do not overlap, though these activities do co-occur.</p> <p>The limited number of people engaged in hand gathering on the rocky shore, especially during the winter, mean that a significant adverse effect on estuarine birds is unlikely. Both activities occur at low tide when birds are less likely to be disturbed and have space to avoid people, so disturbance is unlikely to have a significant adverse impact even in combination.</p>	<p>Bait digging is highest at spring tides and therefore at the same time as hand gathering activities. Though spatially separated, this could increase disturbance pressure as a larger area of coast across different habitats is facing human pressure however these activities have different seasonal peaks with higher activity levels in the winter for bait digging and in summer for periwinkle collection. So activities are unlikely to be occurring at high levels at the same time. Further there are small numbers of people intertidal gathering at any one time.</p>
Coastal Infrastructure	<p>Outflow pipes Maintenance</p>	<p>Appropriate licence conditions/monitoring has been incorporated to mitigate any impacts.</p>	<p>Small scale – low number of outfall pipes on reefs along the Northumberland Coast. Any intertidal impacts will be connected with maintenance and carried out infrequently.</p>
Coastal management scheme - Northumberland and North Tyneside Shoreline Management Plan 2 (05/2009) covers the coastline from the	<p>Flood and erosion risk management</p>	<p>As stated in Section (2) of the document projects and plans within the SMP are subjected to its own Appropriate Assessment for</p>	<p>Any coastal management works along the coast under the aegis of a Coastal Management Scheme.</p>

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Scottish border to the River Tyne.		proposed work, which assesses any impacts to NCSPA.	
Cable laying/infrastructure	Subsea cables with intertidal element	Appropriate licence conditions/monitoring has been incorporated to mitigate any impacts. Plans or projects must obtain a marine licence which must assess impacts to reef features within NCSPA.	Any subsea cables, with an intertidal element, along the coast relating to the relevant plan or projects under Marine and Coastal Access Act.
<b>Other activities being considered (which are not plans or projects by definition)</b>			
<b>Activity</b>	<b>Description</b>	<b>Assessment</b>	<b>Potential Pressure</b>
Intertidal Recreational Activity: Rock pooling	The rocky intertidal areas of NCSPA are popular rock pooling spots. This activity is highly seasonal occurring in the summer months over low tide.	In certain areas where rock pooling activity is high, there is a potential in combination impact from rock pooling and periwinkle gathering activities.	Impacts are likely to be similar to those caused by intertidal hand gathering where rocks are turned and cryptic habitats searched.