



Marine Biosecurity: Best Practice by Sector

Introduction

There are many things that a coastal site manager or user can do to lower the risk of spreading non-native species. The type and number of actions will vary depending upon the individuals, businesses and organisations involved, their operational parameters and budgets. In certain locations, proximity to Marine Protected Areas or sites with other conservation status will need to be considered. In general however, measures will focus on the following aspects of control and awareness raising which should be prioritised according to your site and activities:

- **Remove** unrequired man-made structures from the water. In general INNS prefer artificial structures and removing what you can is an easy to do basic biosecurity measure. This could include temporary removal or moving structures out of the preferred growth zone e.g. removal of mooring buoys in winter to a yard on land, and dropping the mooring chain to the seabed to smother fouling (attaching a riser to allow retrieval). It also means running a tidy site and not allowing old fenders, warps, keep nets, etc. to stay in the water.
- Air **dry** what you can, when you can. Most, if not all, marine and aquatic INNS are killed by dehydration. Identify opportunities to dry out equipment or infrastructure as often as possible. This could mean a drying room for dive kit, or on shore storage for vessels, including barges, if not in use.
- Expose to **fresh water**. Make the most of any natural flows of freshwater into your site. Marine INNS need some degree of salinity to sustain their life cycle – if you can expose them to fresh water through immersion or wash down you will reduce the risk posed by INNS. Likewise species adapted to survive in brackish water can be killed off by exposure to full salinity.
- **Awareness** - Many people are unaware of marine INNS and the threats associated with them and raising awareness often empowers people to take action. Whilst it is not necessary to become a marine biologist, some idea of what to look out for gets people interested and increases effective reporting and your biosecurity actions list should include opportunities for training and

dissemination of information e.g. through public signage or ID guides for staff and volunteers.

- **Share the responsibility** – Biosecurity is most effective when everyone uses the same principles. In all relevant contracts for example with construction contractors, tenants etc. include text relating to biosecurity e.g.
 - ✓ The contractor must submit a Biosecurity Plan or Risk Assessment for written approval at least 6 weeks prior to commencement of the works.
 - ✓ The contractor must submit an updated Biosecurity Risk Assessment for written approval by a relevant date.
 - ✓ The contractor must ensure that all equipment, materials, machinery and PPE used are in a clean condition prior to their arrival on site to minimise risk of introducing non-native species into the marine environment.

Whilst it is recommended that individual sites create a biosecurity plan for their own operations it is also recommended to have plans which cover large geographical areas such as whole estuaries or wider areas so that actions can be shared and coordinated amongst all the key stakeholders. It may be useful for you to take specialist advice to ensure you are selecting actions which are appropriate and effective for your activity and site.

Best Practice Advice by Sector

- [Managers of Coastal Facilities](#)
- [Managers of Small Scale Marine Leisure](#)
- [Managers of Larger Scale Marine Leisure](#)
- [Boat Users/Owners](#)
- [Commercial Marine Operations](#)
- [Port, Harbour and Marina Managers](#)
- [Mariculture, including fin and shellfish farming](#)
- [Commercial Shipping](#)

General Advice to Managers of Coastal Facilities

If you run a marine business, a coastal site or a marine recreation club, consider writing your own biosecurity plan which is relevant to your activities. Guidance on writing biosecurity plans is available on the [RAPID LIFE](#) website. Keep it simple and useful to you and your team. It is useful to appoint a person to keep it under review.

Be aware of marine INNS and know how to report suspicious looking growth.

Remember –

- You don't need to be a marine biologist – Look out for unusual growth patterns, areas which have obviously quickly been taken over or which just don't look 'normal'.
- Take photos, an accurate note of the location (e.g. latitude/longitude, or OS grid reference) and record an estimate of quantity/area covered.
- Record your sighting by emailing alertnonnative@ceh.ac.uk

Small Scale Marine Leisure: dinghy sailors, trailer sailors, kayakers, divers, anglers, etc.

General Advice

If you launch either yourself (e.g. shore divers) or a boat (e.g. trailer sailors or dive/fishing boats, etc.) from coastal slipways or beaches, you run the risk of moving INNS from one site to another. Even a relatively small change of location can mean the difference between a INNS becoming invasive or staying relatively under control, so it is important for you to follow the best practice laid out below.

Remember that INNS are tough and can survive for long periods in the right conditions. Checking all your kit is important. Clean anywhere on your trailer which could contain water or sediments such as inside the box frame, on the boat supports or under the wheel arches. Clean your boat too remembering to drain out all water from inside the hull. Your kit will need a wash too.

Anglers should be particularly aware of biosecurity when they use live bait or bait imported from other countries which may have INNS on it. Best practice would be to only use indigenous live bait which has been sourced locally. If you use bait which has come from further afield, take time to clean it (e.g. with freshwater, remembering to dispose of the waste water onto the grass or into the foul sewer, well away from the waterbody it came from) and take care not to release viable animals into the wild as this would be an offence under the Wildlife and Countryside Act.

Best Practice

- Aim not to move any sediment, water or other material such as weed from one site to another.
- Rinse everything you can with fresh water after use including rinsing through your outboard's cooling system.
- Dry out all the kit you can between uses. This includes wet/dry suits, booties, tanks, dinghies, lifejackets etc.
- Read and circulate [The Green Blue](#) advice
- Much like safety, encourage a reporting ethos within your group or club.
- Raise awareness of key INNS by circulating species information and updates.

Managers of Larger Scale Marine Leisure: facilities including marinas for yachts, RIBs, motor boats, etc.

The following list of possible marine biosecurity control measures is not exhaustive, and every site manager will need to develop their own appropriate set of actions.

Site Managers

It is important from the outset that you understand your site and the environmental conditions that may make your area a suitable host for INNS. For example, you could gather information about tidal currents and salinity in your area or encourage local universities to run research programmes which will study biofouling settlement patterns or the efficacy of different antifouling coatings in the area; [Practical Boat Owner](#) magazine did a useful guide in 2016.

Other actions that could be considered include the following:

- **Wash Down** - Install an inceptor or closed-loop wash-down system for cleaning vessels. A useful guide has been collated by [The Green Blue](#)
- **Moorings** - Drop unused moorings to the seabed in winter. As long as the chain is falling into mud this will smother any fouling which has accumulated on the riser and chain through the season. It also reduces wear and tear. Use a rope riser and small buoy to mark the mooring.
- **Hull Fouling** - If a vessel has hull fouling in excess of ranking 4 (see ranking below) advice should be given to the owner about biosecurity and they should be encouraged to clean as soon as possible.
- **High Risk Areas** - Identify high risk locations in your marina/site and monitor them for unusual growth e.g. near the lifting and wash-down area, on breakwaters or pontoons and on any vessels, which do not regularly get used and/or have heavy fouling.
- **Partnership Working** - Seek opportunities to work in partnership with research organisations or conservation groups to improve monitoring, training and reporting.

- **Freshwater** - Use any natural freshwater inflows to the site to best advantage. These areas will have a lower salinity which will be hostile to most INNS and will reduce fouling on equipment and vessels.
- **Monitoring** - Regularly check pontoons and move extraneous equipment from the water including warps, fenders, tenders, ropes, aquaculture equipment etc.
- **Cleaning** - Haul out, clean and antifoul all work boats at least annually.
- **Dredge Disposal** - Check and appropriately dispose of dredged material – discuss any concerns regarding INNS with your licencing authority.
- **Debris Disposal** - Always dispose of marine debris removed during cleaning operations to landfill and not to sea, even where INNS have not been identified.
- **Antifouling** - Regularly antifoul suitable sub-surface structures. This could include removable items such as safety ladders or other detachable equipment.
- **Antifouling** - Check niche areas of the hull of any stationary vessel regularly by camera. If biofouling is extensive (3 or above, see table below) request clean or haul out.
- **Diver Surveys** - When diving inspections are made to check the physical integrity of submerged marine infrastructure take the opportunity to undertake a biofouling survey. If video or photographs are taken send these to an expert for analysis.
- **Monitoring** - Encourage INNS researchers, students, volunteers and amateur taxonomists to use your site and to share their findings with you.
- **Reporting** - Discuss options for telling other key stakeholders about local INNS records with local Natural England staff.
- **Reporting** - Establish a single point of contact for INNS sightings with local Natural England staff.
- **Reporting** - Encourage a reporting ethos within your organisation.

Staff

- Give staff basic identification training and identification guides
- Encourage staff to be alert to unusual growth in the marine environment.
- Place visual aids in mess rooms and offices to aid identification.
- Encourage an open culture of reporting unusual sightings, including photographing and recording of extent and lat/long.
- Ensure wash-down operators fully clean hulls including niche areas such as bow thruster tunnels.
- Encourage staff to be aware of and report any heavily fouled vessels.

Tenants and Contractors

- Check all relevant tenants are aware of the need for clean hulls on vessels including those in the brokerage.
- Audit tenants to ensure they are aware of biosecurity requirements.
- Encourage tenants to carryout hull/equipment cleaning and ensure no water goes back into marine environment.

- Check all relevant contractors are aware of the need for clean hulls on workboats.
- Work biosecurity clauses into your regular contracts, including any events

Customer Facing

- Annual haul out and cleaning of all customers boat hulls should be encouraged and should be done as a minimum for work boats.
- Advise customers to follow instructions closely when applying antifoul. Facilitate information sessions where antifouling paint manufacturers can give advice to customers.
- Make [The Green Blue](#) advice available to customers.
- Include biosecurity information in communications with berth holders e.g. in the annual handbook.
- Make vessel haul-out facilities, with wash-down capture, and dry stack options available to customers.
- Raise awareness of key INNS and encourage reporting particularly by wash down staff.

Boat Users/Boat Owners

- Use your boat as much as possible. Most antifouling paints work through being eroded by passing water – the more you use your boat the better it will work. Using your boat every two weeks or more will dramatically reduce build up, even if it is only a run around the bay!
- Use the best antifoul for your boat and type of use.
- Apply and use the antifoul as directed by the manufacturers. Be aware that antifoul which is designed to last 2 years is generally not designed to be hauled out for the winter and scrubbed down.
- Use your boat frequently to minimise the build-up of fouling and ensure the ablative paint works effectively.
- When hauled out for wash-down, use a facility which captures the run off. If this is not possible wash your boat as far away from the water's edge as you can, well above the extreme high-water line, and make sure none of the scrubbed off material gets back into the sea. Using a tarpaulin to catch the scrapings can make the clean up easier.
- If you are unable to use your boat regularly or have to leave it for a long period, consider having your boat hauled out and dry-stored.
- Drop your mooring to the seabed in winter to smother any fouling which has accumulated through the season.
- Read and adhere to The Green Blue advice.
- Always follow the Check/Clean/Dry process checking your kit for any foreign material, cleaning it off with freshwater and drying when you can. Keep it

practical, for example, use a bucket to wash down your anchor and chain as you leave an anchorage with water from that area.

Commercial Marine Operations: fishing, diving, maintenance and construction companies

Slow moving vessels and vessels with gear which interacts with the seabed are at high risk of spreading INNS. You can reduce your risk by following the best practice advice.

Best Practice Advice:

- Give staff and crew basic identification training and ID guides
- Encourage the crew to be alert to unusual growths in the marine environment.
- Place visual aids in mess rooms and offices to aid identification.
- Encourage an open culture of reporting amongst your staff and crew including photographing and recording lat/long of sightings of unusual species.
- In order to reduce the likelihood of spreading INNS always either wash down equipment into the same water body or wash down well away from the water's edge. For example if you haul and clean your creels either wash them down in the area they have been hauled from or onshore away from the water's edge where no residues can return to the sea.
- Seek opportunities to work in partnership with research organisations or conservation groups to improve monitoring, training and reporting.
- Refer to your local IFCA for best practice advice - see [Association of Inshore Fisheries Conservation Authorities](#) for links.
- Use the best antifoul for your boat and type of use.
- Apply and use the antifoul as directed by the manufacturers. NB: Be aware that antifoul which is designed to last 2 years is generally not designed to be hauled out for the winter and scrubbed down.
- When hauled out for wash-down, use a facility which captures the run off. If this is not possible wash your boat as far away from the water's edge as you can, well above the extreme high-water line, and make sure none of the scrubbed off material gets back into the sea.
- If not in use drop moorings to the seabed in winter to smother any fouling which has accumulated through the season.
- Dry out any kit/gear when possible and wash down when you can with freshwater to kill marine INNS.
- Establish a single point of contact for INNS sightings e.g. with your local IFCA.

Port and Harbour Managers

Ports and harbours are busy and complex sites which means they are at high risk of attracting, and making a home for, INNS. Follow best practice advice to lower your risk and promote healthy biodiversity.

General Advice

- Monitor Horizon Scanning reports from the [GB Non-Native Species Secretariat](#) for potential new INNS.
- Encourage a reporting ethos within your organisation.
- Encourage staff to be aware of and report any heavily fouled vessels.
- Encourage 'open access' recording of INNS by researchers, students, volunteers and amateur taxonomists.
- Discuss options for forming an INNS group locally with Natural England staff.
- Establish a single point of contact for INNS sightings.
- Raise awareness of key INNS and encourage reporting by wash-down staff.
- Put in signage about known INNS and the associated risks and practical control measures around the area - at public slipways, beaches and other access points.
- Place visual aids in mess rooms and offices to aid identification.
- Raise awareness, e.g. with tenants, of the need to remove any unnecessary man-made structures from the water including lowering swinging moorings to the seabed when not in use.

Port Vessels and Structures

- Ensure all port vessels are effectively and appropriately treated with antifouling coatings.
- Haul out work boats at least annually to clean and check antifouling coatings.
- Safely dispose of untreated bilge and ballast water using an appropriate reception facility and ensure your customers do the same.
- Identify a partner organisation who has the expertise to assist with identification of INNS.
- Identify high risk areas which are accessible for monitoring. Mark these on a site plan and identify a routine suitable for monitoring. Photograph the areas using a scale at least annually, but preferably quarterly.
- Aim to identify any areas of INNS and focus in on these as appropriate for monitoring.
- Identify sub-surface structures suitable for regular inspection with an underwater camera e.g. pontoons, moorings, navigation buoys or vessels which are not in regular use. Photograph/video the areas and keep a record.
- Consider using any regularly maintained infrastructure as early warning system e.g. navigation buoys/pontoons which are regularly removed from the water

could be made available to local marine researchers or other trained personnel for regular study when they are hauled out for maintenance.

Visiting Vessels

- Ensure that vessels arrive clean by writing this expectation into harbour regulations. See [Shetland Islands biosecurity plan](#) for an example of this.
- Assess the risk of new vessels when they arrive and if necessary ask them to wash down as soon as possible, assuming wash down facilities can contain debris for disposal to landfill.
- Lesson learn from others - see [Orkney ballast water management actions](#).
- Monitor the last port of call of vessels, especially any which have a foreign flag or which are medium to heavily fouled (ranking 3 or above).

Research

- Develop a better understanding of tidal currents and salinity and their role in the spread of INNS in your area.
- Encourage local universities to run research programmes which will study salinity and settlement patterns in the area.
- Encourage local universities to run MSc or PhD programmes which will study efficacy of antifouling coatings in the area.
- Work with researchers and coatings manufacturers to develop a network of settlement panels to test different coatings.

Mariculture: fin and shellfish farming

Mariculture is a heavily regulated sector and many biosecurity actions will already be in place under measures designed to maintain stock health and pathogen control. The following best practice will further lower risks associated with INNS:

- Identify any high-risk activities not already covered by pathogen controls and decide on relevant actions e.g. survey for INNS before movement of feed barges or before cleaning of nets/sorting shellfish etc.
- Train your staff to be alert to unusual growth in the marine environment including on shellfish and supporting structures as well as finfish cages and feed barges.
- Give staff basic identification training and ID guides.
- Encourage an open culture of reporting unusual sightings including photographing and recording extent and lat/long.
- Place visual aids in mess rooms and offices to aid identification.

- Use the [INNS information for the shellfish aquaculture industry \(Natural England, 2015\)](#) leaflet as a guide to useful biosecurity actions.
- Refer to Natural England for best practice advice. [Shellfish Association of Great Britain](#) also disseminate best practice and advice.
- Encourage a reporting ethos within your organisation.
- Encourage staff to be aware of and report any heavily fouled vessels.
- Encourage 'open access' recording of INNS by researchers, students, volunteers and amateur taxonomists.
- Discuss options for rapid dissemination of local INNS records with local Natural England staff.
- Establish a single point of contact for INNS with local Natural England staff or Fish Health Inspectorate staff.

Shipping: ferries, extractive industries, bulk goods transport, short sea shipping

Most shipping and ferries will be covered by the regulations associated with the United Nations Convention on the Law Of the Sea (UNCLOS). International Maritime Organisation (IMO) [Ballast Water Convention](#) or [IMO guidelines on hull fouling](#) should be the first line of advice for this sector, however, following the best practice outlined below will further strengthen your biosecurity:

- Identify high risk vessels and areas for additional monitoring e.g. vessels using long distance or Short Sea Shipping (SSS) originating from high risk ports with significant INNS and the areas where these vessels dock or are moored e.g. longer duration holding sites or anchorages.
- Monitor these vessels and areas for unusual growth patterns at least quarterly.
- Take advantage of opportunities to survey vessels e.g. when structural surveys are undertaken also look for unusual growth patterns and report as required.
- Train staff to be alert to unusual growth in the marine environment.
- Give staff basic identification training and ID guides.
- Encourage an open culture of reporting unusual sightings including photographing and recording extent and lat/long.
- Encourage staff to be aware of and report any heavily fouled vessels.
- Refer to credible organisations such as the IMO for best practice advice.
- Seek opportunities to work in partnership with research organisations or conservation groups to improve monitoring, training and reporting.
- Encourage 'open access' recording of INNS by researchers, students, volunteers and amateur taxonomists.
- Establish a single point of contact for INNS sightings with a relevant authority.
- Place visual aids in mess rooms and offices to aid identification.

Hull Fouling Ranking Table

Rank	Description	Visual estimate of fouling cover
0	No visible fouling. Hull entirely clean, no biofilm* on visible submerged parts of the hull.	Nil
1	Slime fouling only. Submerged hull areas partially or entirely covered in biofilm, but absence of any macrofouling.	Nil
2	Light fouling. Hull covered in biofilm and 1–2 very small patches of macrofouling (only one taxon).	1–5 % of visible submerged surfaces
3	Considerable fouling. Presence of biofilm, and macrofouling still patchy but clearly visible and comprised of either one single or several different plants and animals.	6–15 % of visible submerged surfaces
4	Extensive fouling. Presence of biofilm and abundant fouling assemblages consisting of more than one plant and/or animal.	16–40 % of visible submerged surfaces
5	Very heavy fouling. Diverse assemblages covering most of visible hull surfaces.	41–100 % of visible submerged surfaces
*Biofilm: Thin layer of bacteria, microalgae, detritus and other particulates.		