Biosecurity Planning for Marine Non-Native Species

Marine Pathways

Managing marine non-native species

Cyfoeth Naturiol Cymru

Natural Resources Wales

Part One

An introduction to Marine Non-Native Species

Some key definitions:

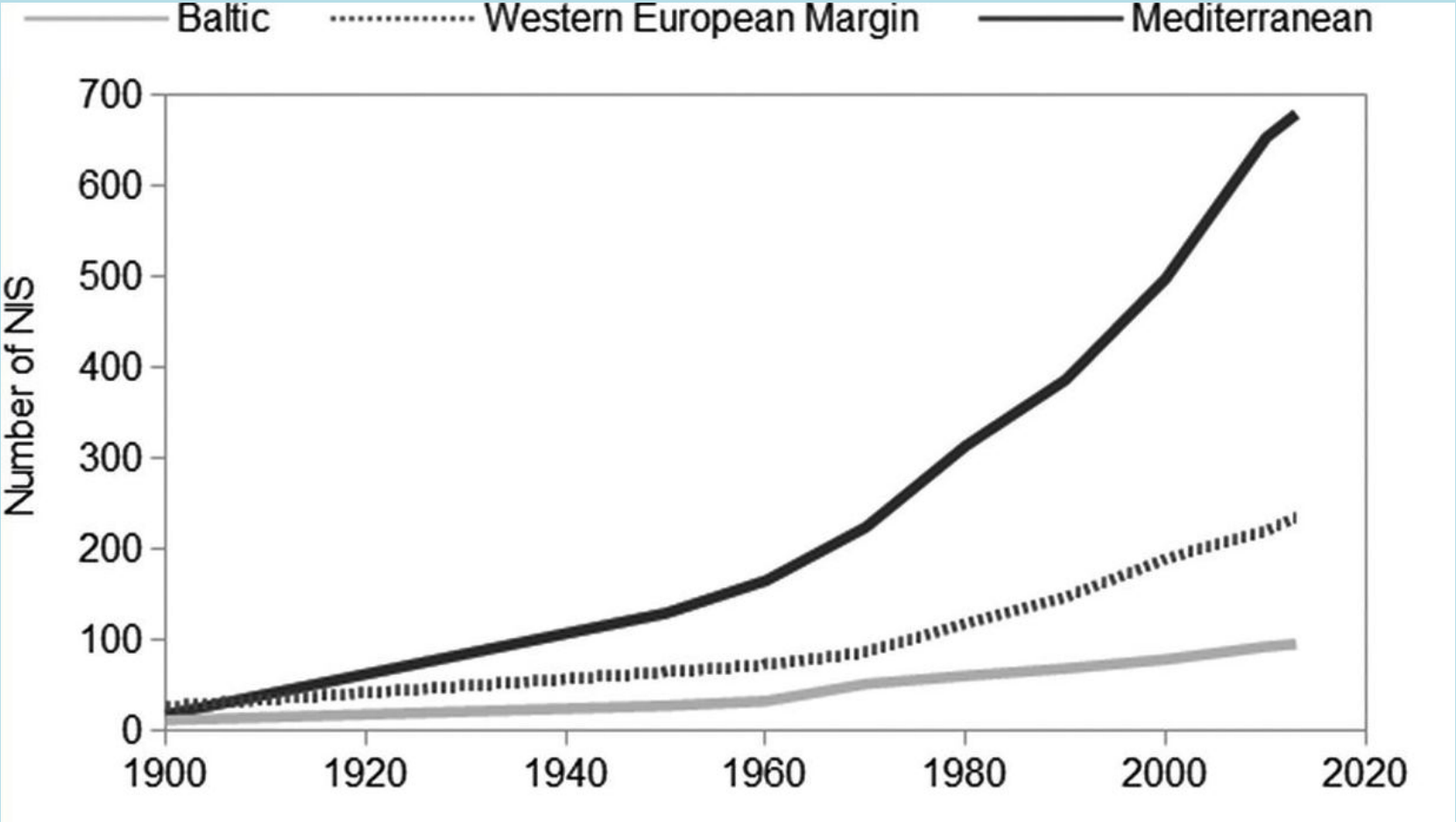
Non-native species (NNS) – Species introduced by human activities outside their natural past or present distribution and dispersal potential that survive and subsequently reproduce.

Invasive non-native species (INNS) – Species whose introduction and/or spread threatens biological diversity or cause economic damage.

Biosecurity - Taking action in order to minimise the introduction or spread of a species

Pacific oysters – Mersea island Photo GBNNSS

Trends



Cumulative number of marine non-native species recorded three sea areas

Where do they come from ?

Ocean region origin of UK Marine INNS in descending order:

Northern Pacific
North West Atlantic
South Pacific
W Atlantic
Indo-Pacific
Pacific
SW Atlantic

Costs

The estimated to cost to the UK economy of Invasive Non-Native Species is £1.7 billion per annum, including £7.1 million per annum to aquaculture industry alone.

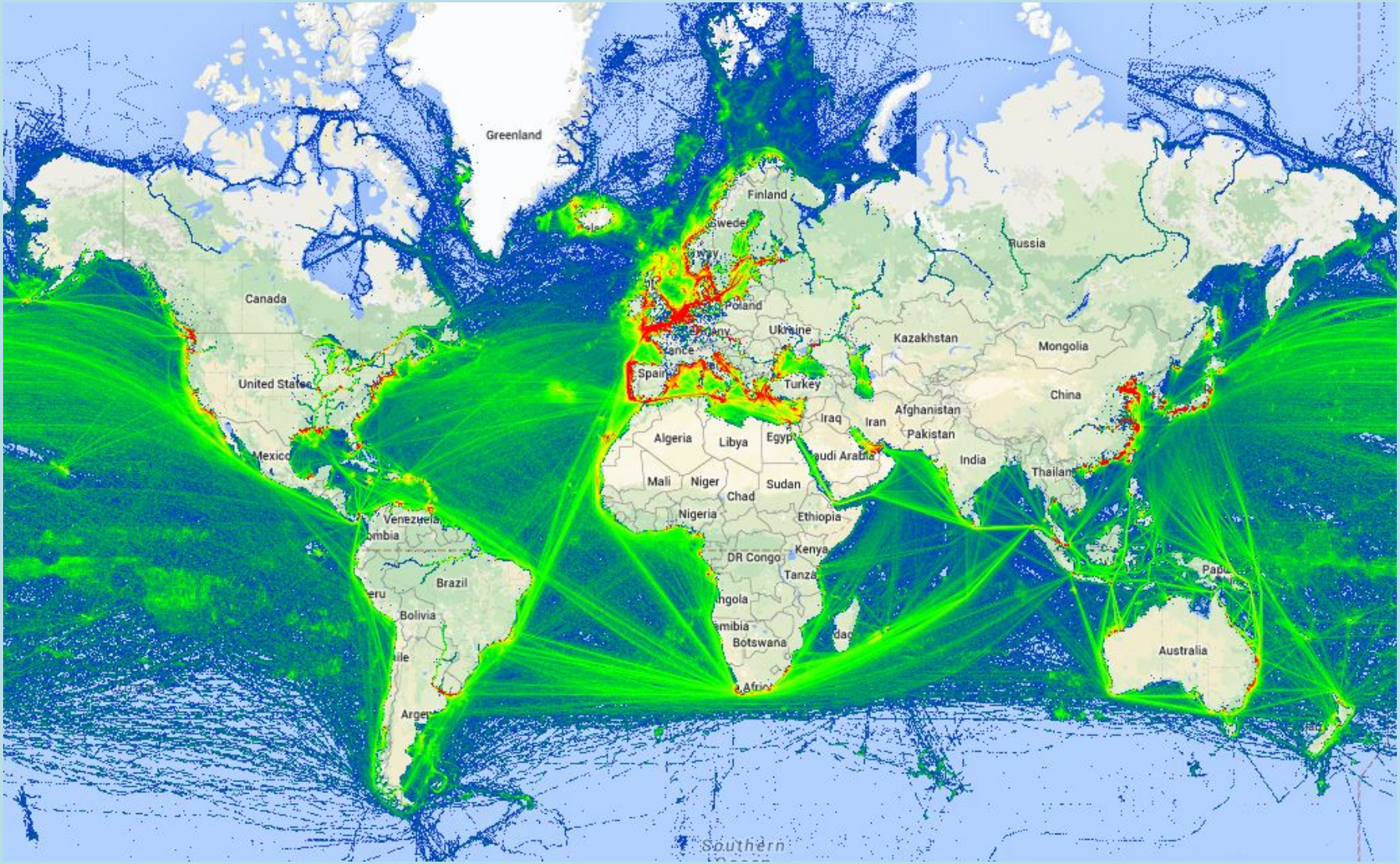
More than ninety marine and brackish water NNS have been recorded in the UK, 58 are established

A number of species have already been linked with significant fish kills and clearance costs from aquaculture sites and marinas in the UK (e.g. *Karenia mikimotoi* (an algae), slipper limpet, carpet sea squirt)

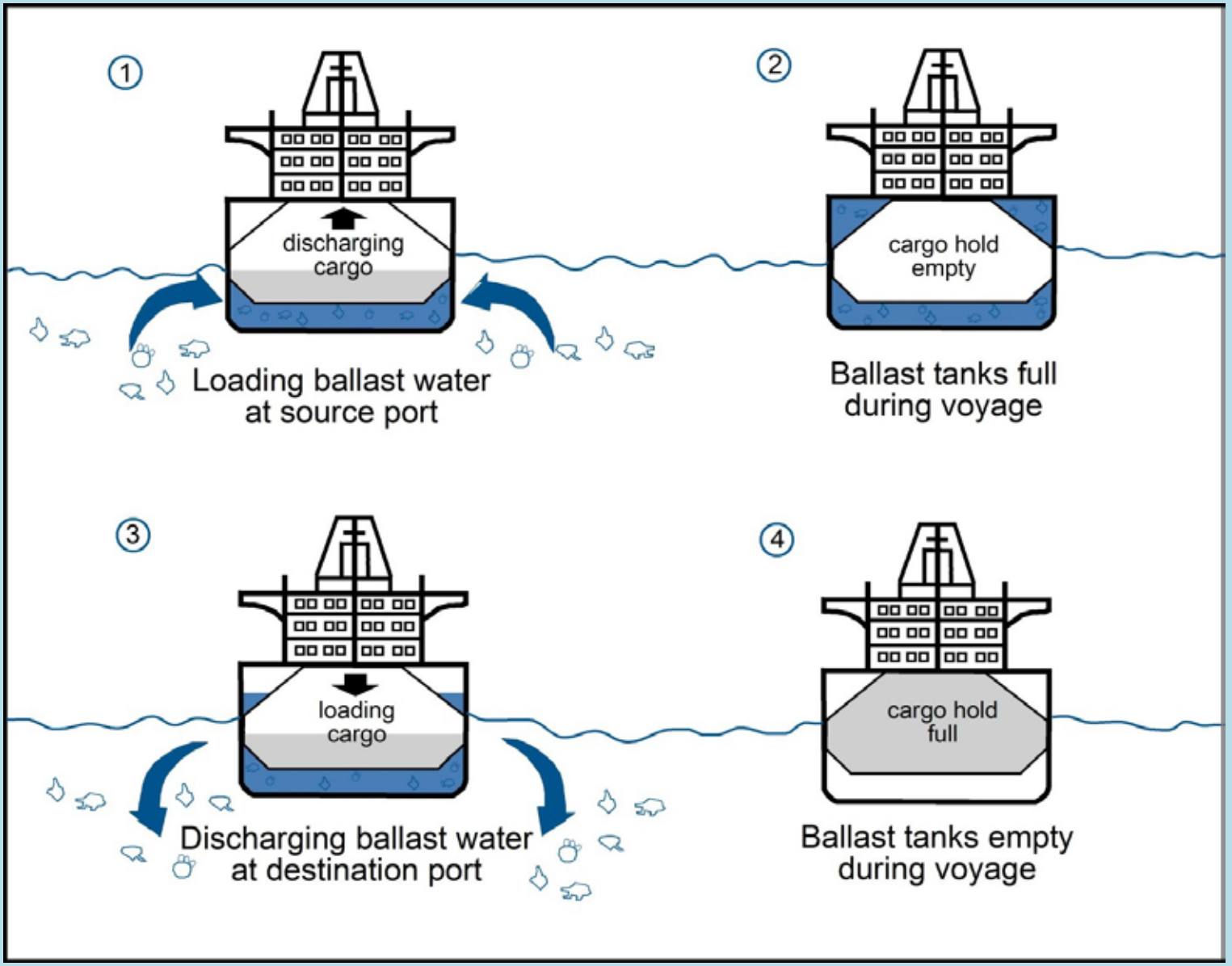
How do they get here - pathways of introduction ?

- The principal vector for introduction is the movement of vessels
- Marine aquaculture (mariculture) is also a major source of non-native species either as a contaminant of fish/shellfish stock of escape of the cultivated species themselves
- Anthropogenic flotsam and live food are also significant

Density map of world shipping movements



Transfer by Vessels 1- Ballast Water



Transfer by Vessels 2
Hull Fouling

Photo GBNNSS/ Parkol Marine Engineering Ltd

Mariculture examples

Slipper limpet

Can be spread as a contaminant of shellfish for culture e.g. edible mussel stock

Pacific oyster

A non-native species introduced for culture within shellfish farms which has now spread to the wild is s

Photos from GBNNSS

Other vectors - Marine Origin Debris

In 2012 a 188-ton large commercial fisheries dock lost from Misawa on Honshu Island during the previous year's Japan tsunami, washed ashore on Agate Beach in Oregon. Assemblage of marine 90 non-native species found on the dock, several already known as high-profile invasive species.

Images available at:

http://blogs.oregonstate.edu/floatingdock/2012/07/30/marine-organisms-found-on-floating-dock/

And:

http://www.ibtimes.co.uk/japan-tsunami-debris-floating-dock-harley-davidson-350217

Live food

Chinese mitten crab

Photos – GBNNS Fera

Part Two

Biosecurity and Biosecurity Plans – some real world examples

Case Study 1 – The Firth of Clyde

The Firth of Clyde Forum

Mission Statement

To promote integrated, sustainable management of the Firth of Clyde's environmental, economic and community resources.

Firth of Clyde FORUM

The Firth of Clyde

Non-native species already present:

- Carpet sea-squirt (*Didemnum vexillum*)
- Wireweed (*Sargassum muticum*)

- Also a single recent record of Chinese Mitten Crab

Want to keep out:

- Slipper limpet (*Crepidula fornicata*)

- The Killer shrimp (*Dikerogammarus villosus)* from fresh and brackish waters

Firth of Clyde

BIOSECURITY PLAN

2012 - 2016

Prepared by

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Firth of Clyde Forum

with funding support from
SNH, SEPA, Scottish Government and RAFTS

NNS Identification Training Days

Carpet sea-squirt clean-up: Largs Marina

Case Study - 2 Grafham Water

Some Lessons Learnt

Biosecurity basics i.e. CHECK - CLEAN – DRY are simple and common sense but harder than it sounds especially when dealing with bigger vessels and infrastructure which cannot be removed from the water

Once infestation has occurred, control is very difficult and expensive. Better to plan to avoid it.

Biosecurity planning is:

- Cost effective, pragmatic
- Meets legal requirements
- Site, operation or event specific, a tailored approach
- User created therefore useful to the user

Part Three

Why do we need biosecurity ?

The legal drives

The law on non-native species is set out in the **Wildlife and Countryside Act** but this has been amended extensively in the different jurisdictions so the law now takes a very different form in the England and Wales to the legal position in Scotland:

The Law In England and Wales

In England and Wales under Section 14 it is an offence to:

Release or to allow to escape any animal which is of a kind which is not ordinarily resident in or a regular visitor to Great Britain, to escape into the wild, or to release into the wild any animal that is listed on Schedule 9 Part I

or to,

Plant or otherwise cause to grow in the wild any plant which is included in Part II of Schedule 9

The law in Scotland

Based on a ‘no release general presumption’ with a much wider and more precautionary approach to prevent the introduction of applies to **any** non-native plant or animal

Offences - Plants

- Planting, or otherwise causing to grow, in the ***wild** outwith it’s native range

Offences – ****Animals

- Release, or allow to escape from captivity, to a place outwith its native range
- Causing an animal outwith the control of any person to be in a place outwith its native range

*The Wild is defined in a Code of Practice and excludes built up land and cultivated areas.

**Offences not defined to any area or place and are not restricted to *the wild*

Species Control Orders

There are now legal powers in England, Scotland and Wales which give wide-ranging powers in relation to non-native species for specified bodies (e.g. NRW, SNH, EA) to:

- Access land & water
- Offer voluntary Species Control Agreements
- Require land managers to control specified non-native species through Species Control Orders and Emergency Species Control Orders
- Take unilateral action to control or eradicate non-native species

Part Four

Preparing a biosecurity plan

MARINE BIOSECURITY PLANNING

GUIDANCE FOR PRODUCING SITE AND OPERATION-BASED PLANS FOR PREVENTING THE INTRODUCTION OF NON-NATIVE SPECIES

February 2014

Authors: R.D. Payne, E.J. Cook & A. Macleod

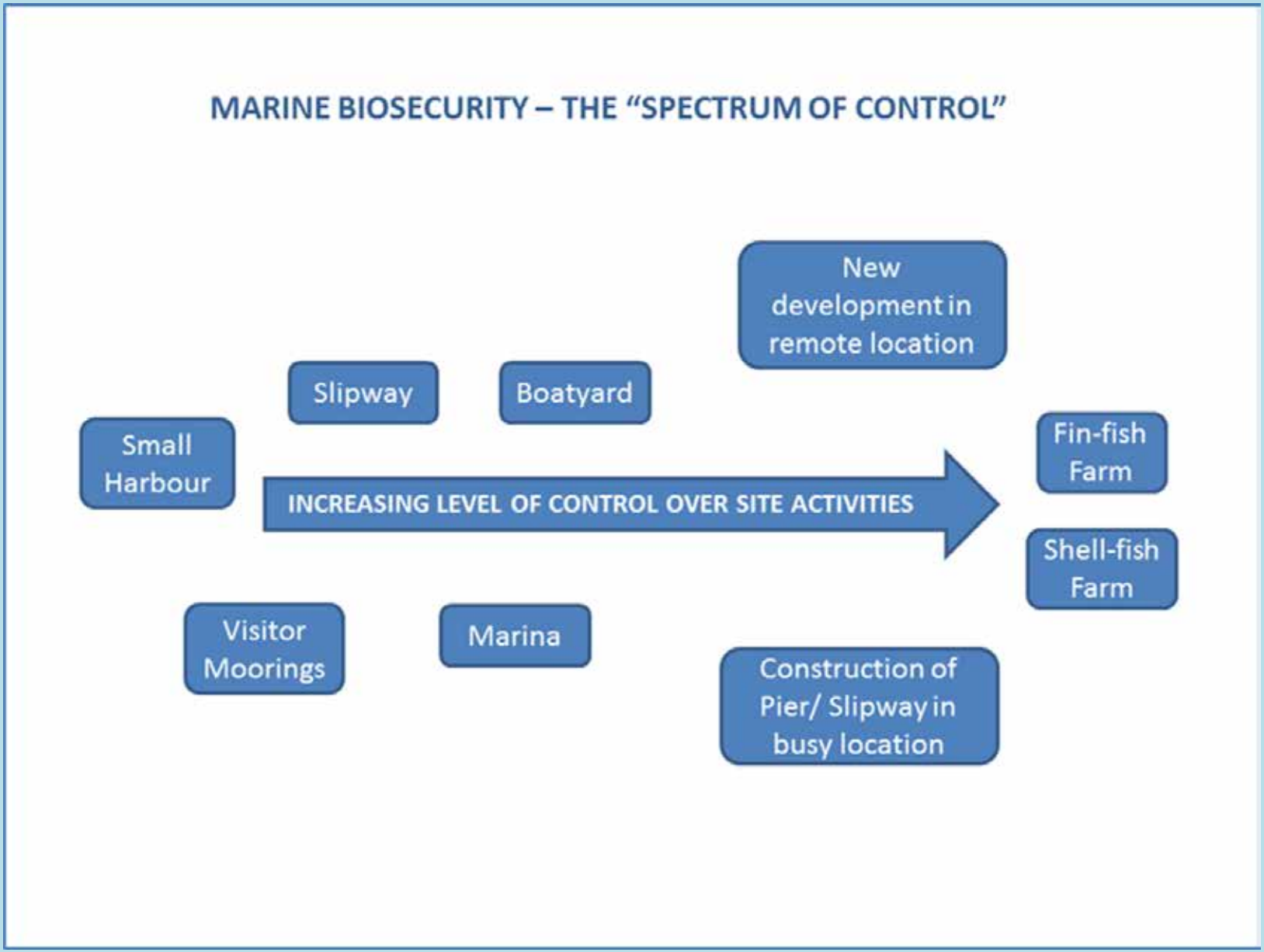
Scottish Natural Heritage
Dualchas Nàdair na h-Alba
All of nature for all of Scotland
Nàdar air fad airson Alba air fad

Firth of Clyde FORUM

What type of biosecurity plan ?

Biosecurity Plan Type	Typical Scope/Content	Examples of Plans
National Plans	Strategic plans at a country or regional scale with actions specified at a sector level.	GB Framework Strategy New Zealand Biosecurity Management Action Plan
Sector Plans	Strategic Plans covering an industry or activity across at a country-wide scale.	Biosecurity plan for Sea Angling and Bait
Area Plans	Plans for a defined geographic area, often a catchment, estuary or coastal zone.	Clyde Biosecurity Plan , Solway Biosecurity Plan
Site Plans	Plans to manage the risk of a range of ongoing and long term activities within a described site or facility. These plans may contain sections dealing with contingency and rapid response to a range of species threats.	Pathogen Biosecurity Measures Plans shellfish and finfish
Operation Plans	Plans covering a defined short or medium term operation.	Planning by the Environment Agency and Port of London Authority for the influx of recreational boats to the Thames for the 2012 Olympics
Species Plans	Plans for the exclusion or containment of an individual species. This plan category also includes rapid response and contingency plans for single species	UK wide contingency planning for the salmon parasite *Gyrodactylus salaris*

Understand how much you can influence activity on your site



Establish the scope and emphasis of the plan

PLAN TYPE	MAIN VECTORS	LIKELY ISSUES	PLAN EMPHASIS
SITE PLANS			
Marina	Yachts, tenders, inflatables, outboards	Biofouling Floating structures Associated boatyard/marine engineering Vessel cleaning	Biosecurity actions for marina staff Biosecurity facilities for boat owners Promoting good practice Surveillance and monitoring Careful/appropriate disposal of hull scrapings after cleaning.
Harbour	Recreational and commercial vessels, cargoes	Biofouling Diversity of vessel types and activities	Promoting good practice Biosecurity facilities for boat owners Surveillance and monitoring
Boatyard	Recreational and commercial vessels	Cleaning vessels	Surveillance and monitoring Careful/appropriate disposal of hull scrapings after cleaning.
Slipway	Recreational and commercial vessels	Biofouling	Promoting good practice Biosecurity facilities for boat owners Appropriate disposal of hull scrapings
OPERATION/EVENT PLANS			
Construction/ Development	Slow-moving vessels, barges, service vessels, equipment	Biofouling Construction materials Dredging	Analysis of biosecurity risk and development of control measures and control points (see Annex B) Bio-secure design of new facilities and installations. Biosecurity control measures for all staff, visitors and sub-contractors
Event	Yachts and other recreational vessels, recreation equipment	Biofouling Origin of vessels	Advanced Planning Communicating good practice and event requirements Monitoring compliance

Step One – Understanding your site

What are the characteristics of your water ?

- Salinity
- Tidal Regime
- Water quality

What are the structures and substrates at your site ?

- Floating pontoons
- Dock walls
- Breakwater

Non-native species already present

- Which non-native species are already present or nearby ?
- Which species are likely to be introduced by the activities on your site or by the event/operation you are holding

Step Two – Understanding how non-native species can be introduced to your site

Vessels

- Port of origin
- Type of vessel
- Speed of vessel
- Condition of vessel
- Signs of biofouling

Step Two – Understanding how non-native species can be introduced to your site

	HIGH	MED	LOW
1. Has the vessel/ equipment just arrived from the local area?			
2. Has the vessel/ equipment had an anti-fouling coating applied to submerged structures within the last 12 months (or time recommended by manufacturer)?			
3. Are all the visible submerged surfaces free of bio-fouling (a green 'slime' is OK)?			
4. Do the visible submerged surfaces have more than a green 'slime' coating?			
5. Does the vessel/ equipment have noticeable clumps of algae and/ or animals clinging to the visible parts of the hull/ rudder/ propeller?			
6. Has the vessel/ equipment just arrived from another country, region or water body with similar environmental conditions (e.g., seawater temperature)?			
7. Has the vessel/ equipment just arrived from a water body known to have NNS present?			
8. Does the vessel/ equipment spend long periods of time stationary at sites in between anti-fouling treatments?			
9. Is the vessel 'slow moving', such as a construction barge or drilling rig?			

Step Three – Identifying activities which risk introducing non-native species to your site

Broad Category	Example Activities
Construction and/ or maintenance of slipways/ jetties/ coastal defence structures etc.	• Use of construction barge and slow moving vessels • Using vessels from locations outside local water body • Importation of materials • Removal of old structures/ equipment • Disposal/ re-use of old structures/equipment
Shore-based boat repairs and/ or over-winter storage	• Moving and haul out of vessels from locations outside local water body • Provision of temporary mooring for boats awaiting haul out • Cleaning of hull and associated structures • Disposal of damaged structures and biofouling removed during cleaning process
Provision of berthing and facilities for recreational vessels	• Operating swinging moorings for visiting and resident boats • Operating pontoon berths for visiting and resident boats • Maintaining moorings and pontoon berths • Removal of old structures/ equipment • Disposal of biofouling removed during maintenance of berthing facilities
Provision of berthing and facilities for commercial vessels	• Operating dockside berths for visiting vessels • Maintaining pilings, ladders, pontoon berths • Disposal of biofouling removed during maintenance of facilities

Step Four – Developing biosecurity measures and actions

Activity type	Example biosecurity measures
Preventing biofouling	• Use the right type of anti-fouling for your site and vessel usage – take advice from manufacturer or chandlery where possible • Replace anti-fouling coating at regular intervals as specified by the manufacturer's instructions or if damage occurs to any surface in the meantime • Consider applying anti-fouling to surfaces not typically coated (e.g., mooring buoys, pontoon floats), if fouling is particularly intense • Use any freshwater inflows to best advantage to reduce fouling on equipment and vessels
Removing biofouling	• Avoid biofouling scrapings entering the water by collecting in tarpaulin • Provide wash down facilities which collect biofouling material during the wash down
Operation of public slipway/ visitor moorings	• Mount permanent and weather proof biosecurity guidance notices on wall post adjacent to slipway/ padlocked barrier to slipway or access point for moorings • Print biosecurity information on reverse side of licence/season ticket for slipway or receipt for moorings • Make adhering to biosecurity guidance a condition of annual licence
Monitoring and surveillance	• All relevant staff to receive a copy of the site/ operation biosecurity plan summary and instructions sheet • All relevant staff to received training in NNS identification • All staff encouraged to report any 'suspect' marine plant or animal to the biosecurity manager

Step Four – Developing biosecurity measures and actions

Control measures and actions should be:

- Effective
- Simple
- Realistic

And must be able to be:

- Easily be turned into instructions for staff or for private vessels out of your control

Step Four – Developing biosecurity measures and actions

Get help !

- GB NNSS Website
- Firth of Clyde Biosecurity Plan
- Invasive Species Ireland
- The Green Blue
- Cefas Biosecurity Measures Guidance
- Oil and Gas Industry Guidelines for Prevention and Management of Alien Species
- IMO Biofouling Guidelines to Minimise Transfer of Invasive Aquatic Species

Step Four – Developing biosecurity measures and actions

Some possible actions:

- Use the right type of anti-fouling for your site and vessel usage
- Gather biosecurity information on all vessels
- Trained all staff in NNS identification
- Make adherence to biosecurity guidance a condition of annual licence
- Provide haul out and wash down facilities which collect biofouling material during the wash down
- Use the customs berth to hold foreign vessels for examination
- Develop an isolation berth
- Use freshwater areas to create a vaccination berth

HACCP: deciding where and when to act

- Hazard Analysis and Critical Control Point (HACCP) is a detailed pathway-based approach that the method outlined in Step 4. It allows you to:
- Look at site activities in greater detail, breaking them down into their constituent parts.
- Develop the biosecurity control measures that should be applied to the tasks.
- Determine when (i.e. during which tasks) the control measures should be applied.

- HACCP was developed by NASA in the late 1950s to ensure the quality and sterility of astronaut food and has been widely adopted by the food industry

- It has been adapted by freshwater fisheries and marine agencies in the USA into a technique to manage the risk of introducing NNS to a site or as part of an operation

- HACCP is designed to facilitate discussions to identify prevention methods and actions to control NNS (non-targets) from the process

- Includes a degree of risk assessment and risk management to identify practical alternatives if needed

Definitions of HACCP Terms

Control measure - actions that can be used to control and remove non-targets (ie NNS**)**

Control point - any step at which potential hazards can be controlled

Critical control point (CCP) - the best point, step, or procedure at which
significant hazards can be prevented or reduced to minimum risk

Pathway - an activity or process through which a species is transferred to a new location where it could become invasive

Target: fish stock, sample, equipment

Non-target: non–natives species

Simplified HACCP in a Nutshell

Step One - List Site Activities

Step Two - Describe Activities

Step Three - Split Activities into Tasks

Step Four - Establish Critical Control Points and Control Measures

Step Five – Develop an Action Plan

Task	***Risk*** *Is there a significant risk of this task introducing NNS (Yes or No)*	***Justification*** *Explain your answer in column 2. If the answer is yes, then describe the risk*	***Critical Control Point*** *Could control measures be applied at this stage*	***Control Measure*** *What control measures can be applied to this task*	***Who*** *Who will carry out the control measure*
Task 1					
Task 2					

Example:

A marina on the east coast of Scotland is closing. A marina on the west coast has bought some of the pontoons, which they intend to collect, transport and re-use on their site to expand capacity. The pontoons appear to only have a light covering of biofouling.

Critical Control Points
Collection from purchase site
Delivery to boatyard
Boatyard checks and repairs

Control Measures
Survey and inspection when collected
Delivery lorry cleaned
Biofouling removed and sent to landfill
Dry pontoons thoroughly

Part Five

Contingency Planning Monitoring and Surveillance

Surveillance, monitoring and reporting

Inspection of vessels/structures may be part of biosecurity measures within the plan but regular checks over a wider area are needed that:

- Don't require expert knowledge, most people can spot changes or something unusual
- Seek as wide a participation as possible amongst staff and water users
- Encourage reporting, promote a culture of reporting through an understanding of why biosecurity matters

Why do we need ‘Contingency Plans’?

Things can, and do, go wrong, for example:

- A new high risk non-native species may be discovered in your harbour

Acting rapidly is particularly important in marine environment, it may be your only chance.

A contingency plan (Response Plan or Rapid Response Plan):

- Allows a rapid response
- Should be site/operation/event specific
- Sets out what to do, who should do it, where and when
- Anticipates barriers to rapid action (e.g. necessary equipment not stockpiled and ready)
- Should be very simple and short
- Understood and available to all (pin it on the wall)

Plan Monitoring

Put in place a recording system (a logbook) to allow you to monitor the plan and ensure that there is a record of:

a) The biosecurity measures which have been undertaken e.g. vessel and equipment cleaning

b) Any potential introductions of non-native species e.g. the unregulated arrival of a heavily-fouled vessel

This logbook should be routinely checked by the biosecurity manager and the dated entries countersigned