To clean or not to clean: views and preferences of recreational boat owners on keeping hulls free from biofouling organisms

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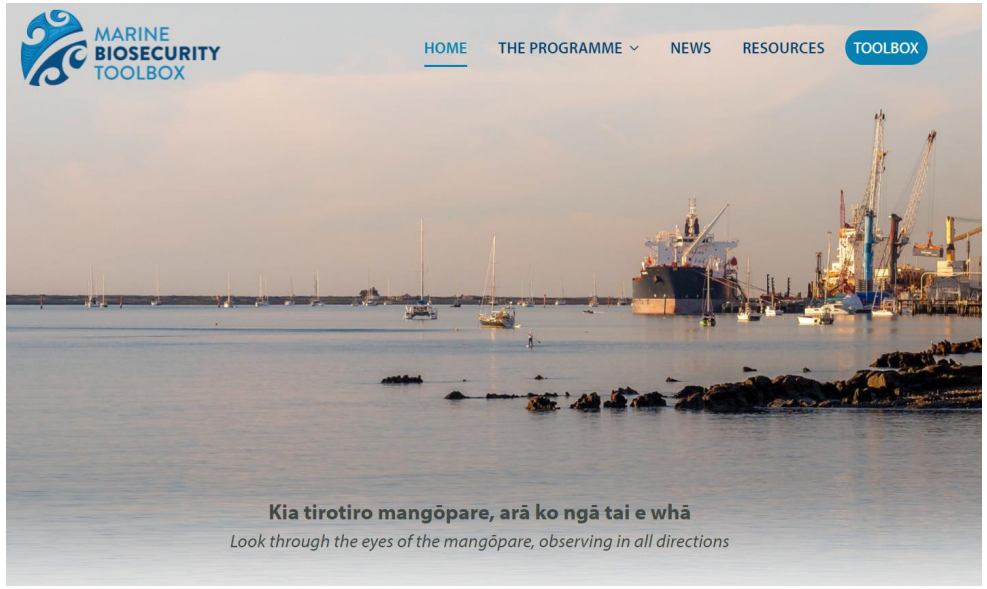
Marine Biosecurity Toolbox

- 5-year MBIE research programme (2019 - 2024)
- Aims to protect New Zealand's marine environments from the impacts of non-indigenous invasive species



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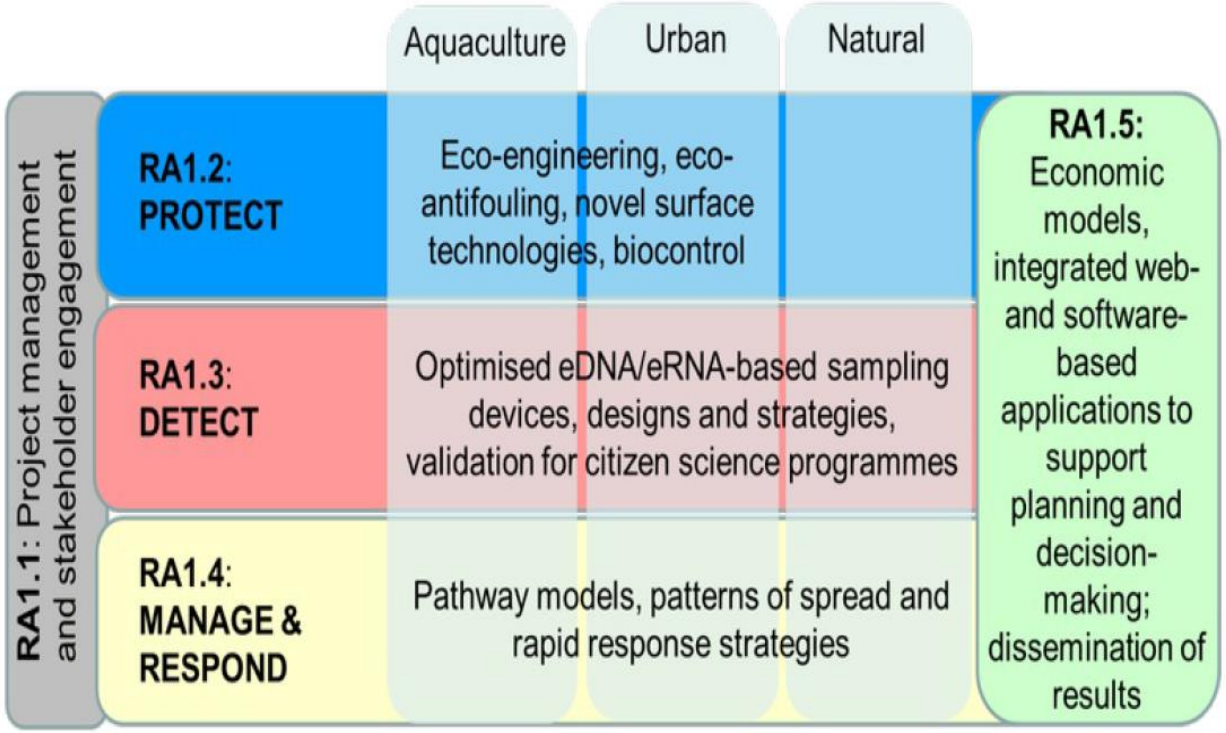


Motivations of the study

- Problem
  - **Biofouling** is the accumulation of microorganisms, plants, and animals on boat surfaces immersed in the marine environment
    - includes invasive species that are a threat to our marine ecosystem and native species (e.g., green-lipped mussels)
    - affects recreational boats especially those permanently in the marine environment (water)
    - more in North Island than South Island
    - councils organised campaigns on hull cleanliness
  - Cleaning boat hulls requires time and money
- Research aim
  - Evaluate the preferences and motivations of recreational boat owners around keeping hulls free from biofouling

Background

- Biofouling control (e.g., hull cleaning, anti-fouling paint) helps improve environmental and fish health (Bloecher and Floerl 2020)
- Research focused on ecological impacts of invasive species, but less on economic impacts
- Aquatic invasions have cost the global economy US$345 billion (Cuthbert et al 2021)
  - Costs of biofouling control to global aquaculture industry ~ 5-10% of production costs (Fitridge et al 2004)
- Recreational boatowners play a crucial role in controlling the spread of biofouling organisms
- We did not find any non-market valuation study on keeping hulls clean from the point of view of recreational boat owners.

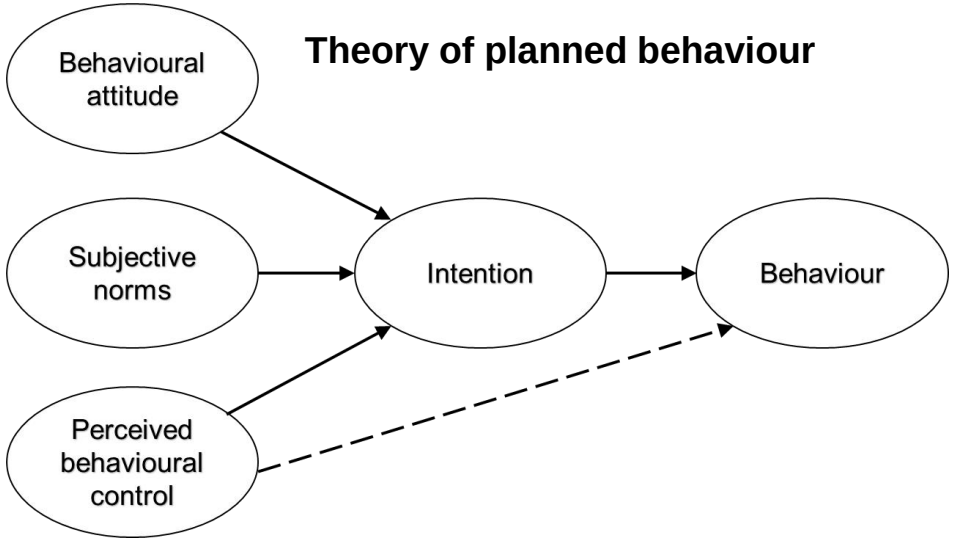
Understanding preferences and motivations of boat owners

- Economic and psychological theories
- Choice experiment (CE)
  - Survey-based approach to indirectly obtain data on the preference of individuals for changes in the provision of environmental goods (e.g., ecosystem services)
  - Estimates values based on how individuals exercised trade-offs across competing options
- Theory of planned behaviour (TPB)
  - psychological theory that links beliefs to behaviour
  - attitude, subjective norms and perceived control shape an individual's behavioural intentions
  - behaviour is susceptible to a range of influences beyond an individual's control, including personal abilities and social constraints

Choice experiment

$$U_{njs} = \sum_{k=1}^{K} \beta_k X_{njsk} + \varepsilon_{njs}$$

Theory of planned behaviour

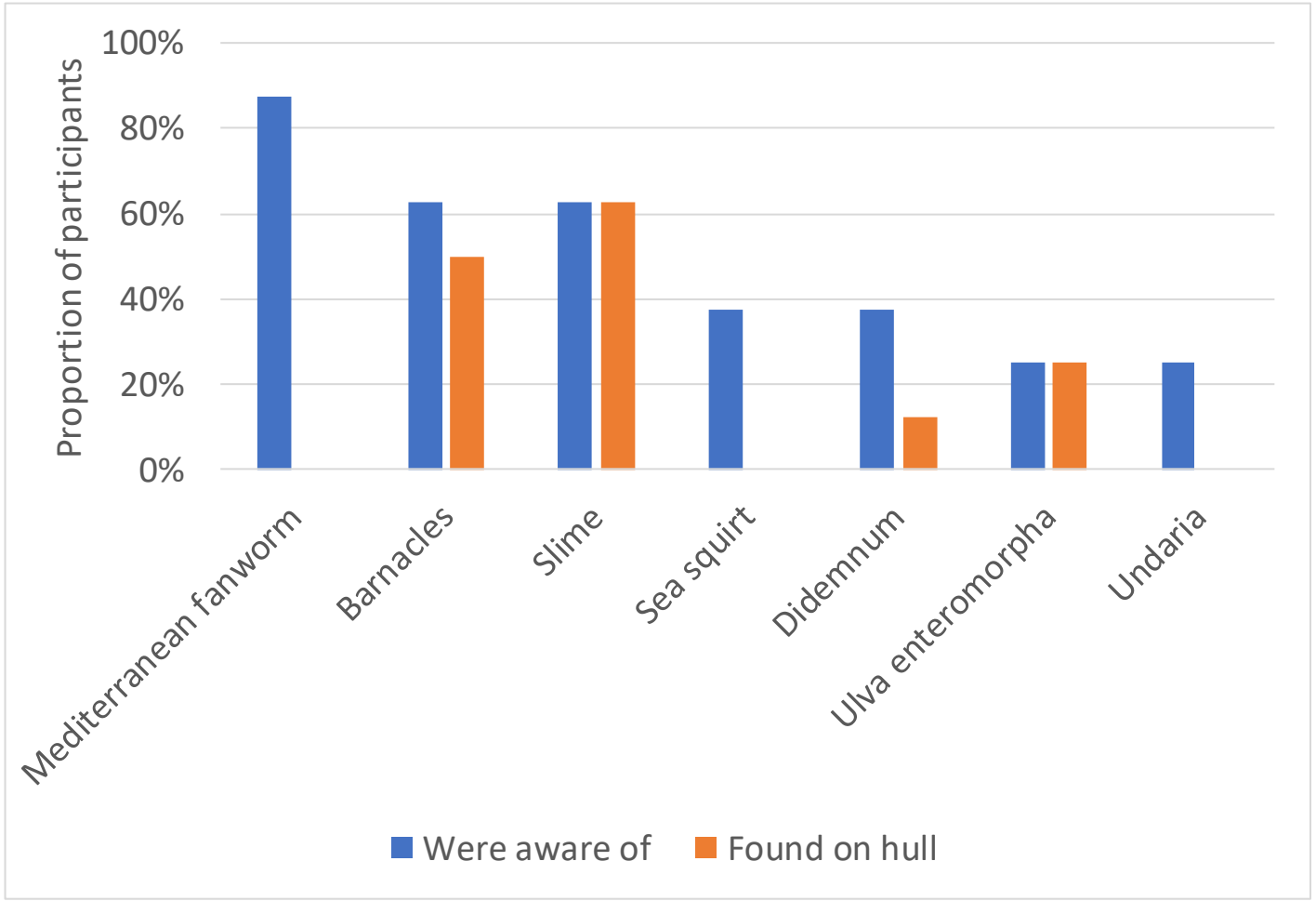


Understanding preferences and motivations of boat owners

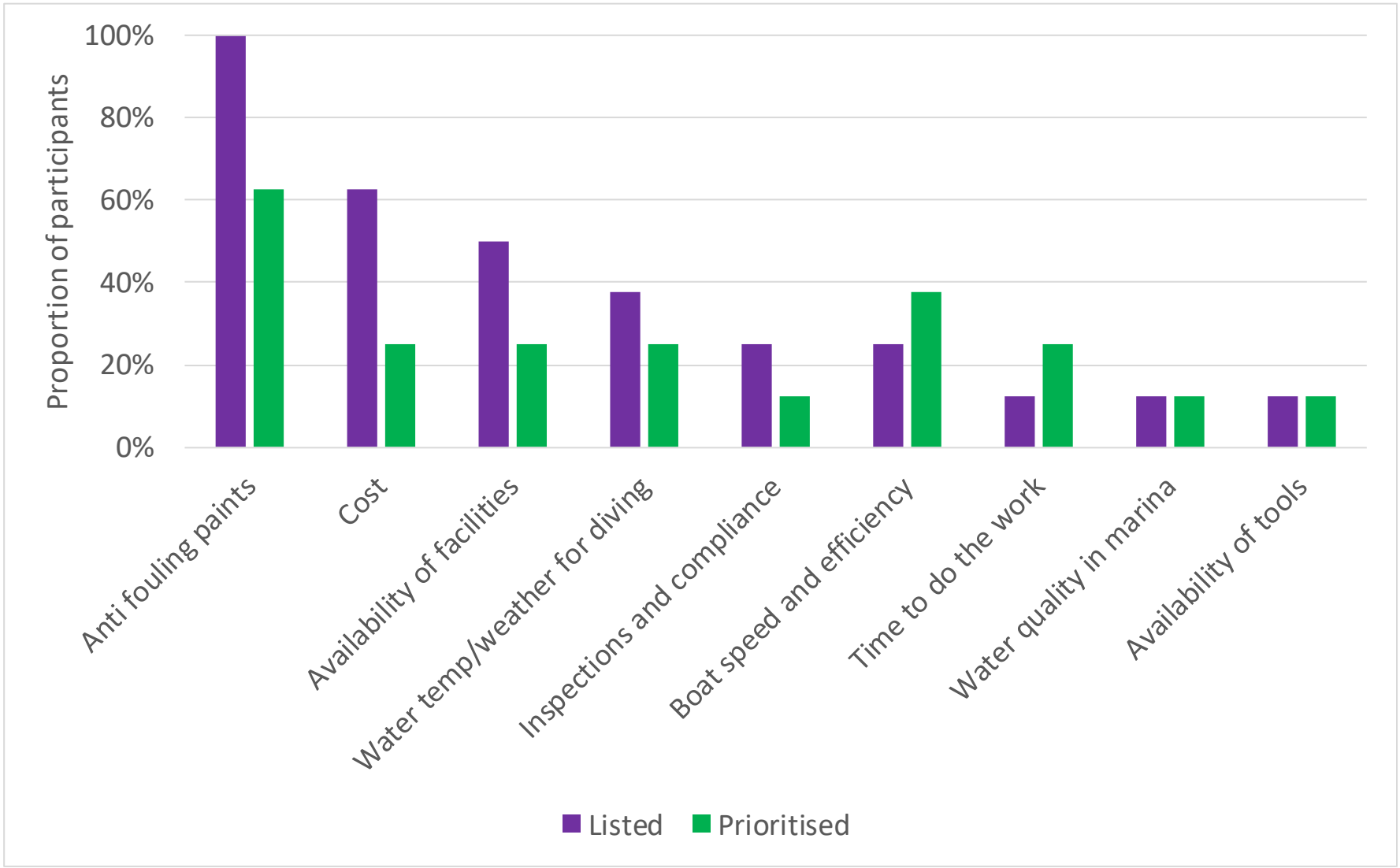
- A national survey to understand NZ boat owners' behaviour & preferences on keeping hulls clean
  - owners of boats permanently on water (exclude trailer boats)
  - co-designing the survey with end users – BNZ, councils (Auckland, Northland, Bay of Plenty, Waikato, Marlborough) and industry (Aquaculture NZ)
  - understand the biosecurity issue from a large sample of NZ boat owners
- Focus group (FG) in Nelson in Oct 2021
  - collected views of eight recreational boat owners on:
    - biofouling organisms (e.g. Mediterranean fanworm)
    - preferences, motivations and support needed
  - FG consisted of three sets of questions:
    - descriptive (awareness, cost, resources, aspirations)
    - open-ended (advantages and disadvantages)
    - cool-down (trial developing survey questions)

Highlights of the Nelson focus group

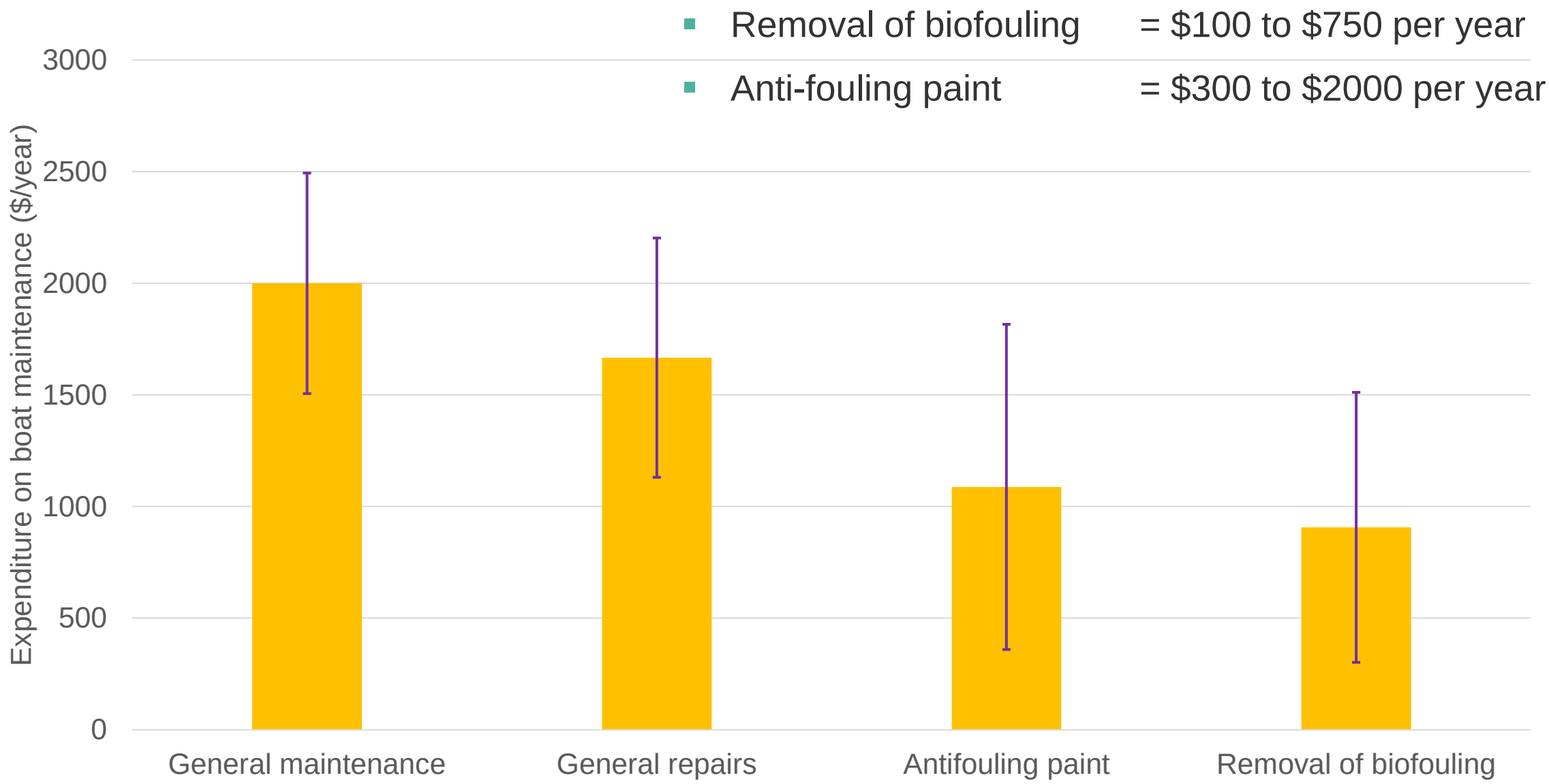
1. What non-native biofouling organisms were you aware of?
2. What species have you found on your boat hull?



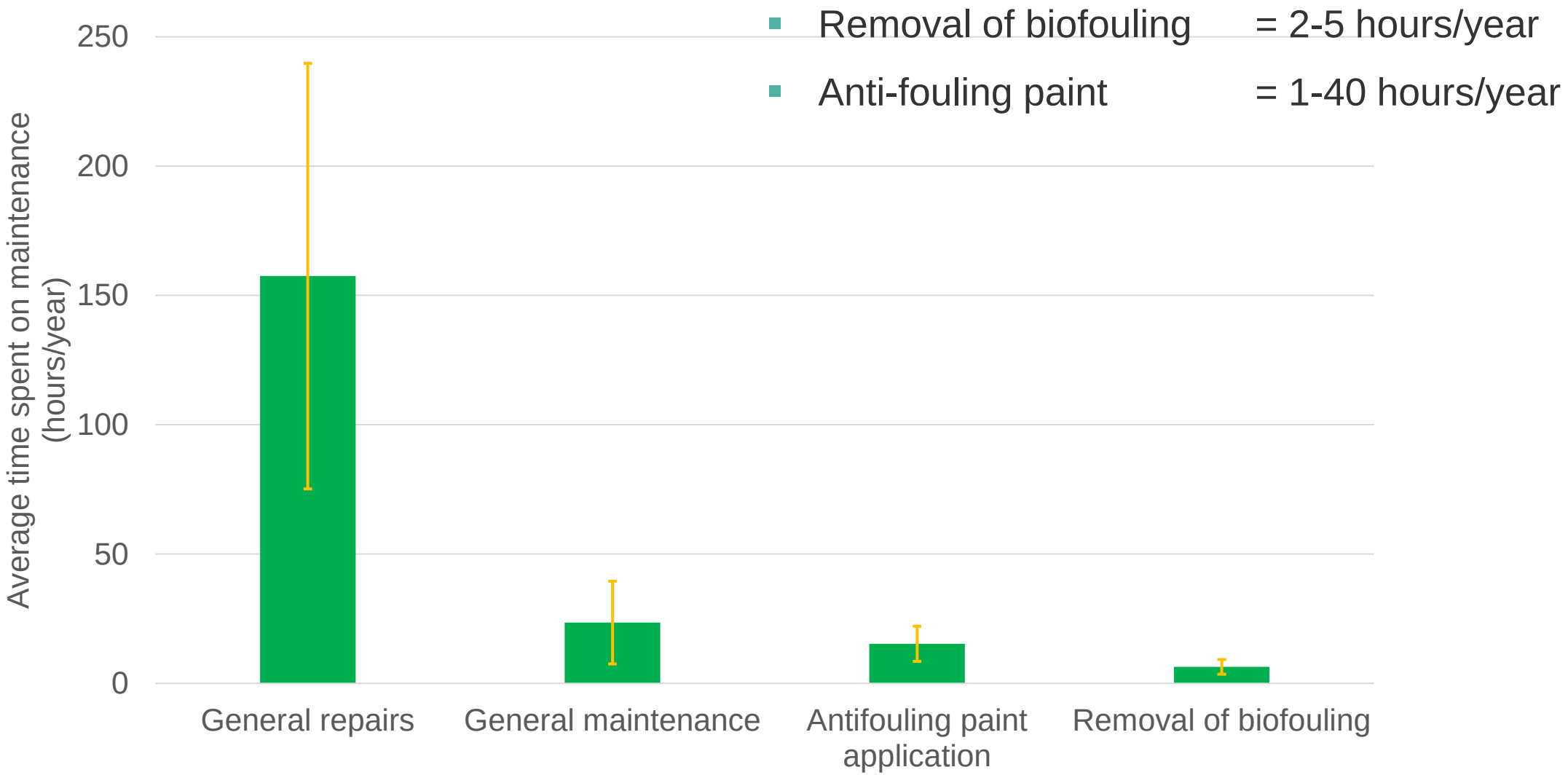
3. Name three factors you consider in keeping hull clean (**List**).
4. Factors that concern you most in keeping hull clean (**Priority**).



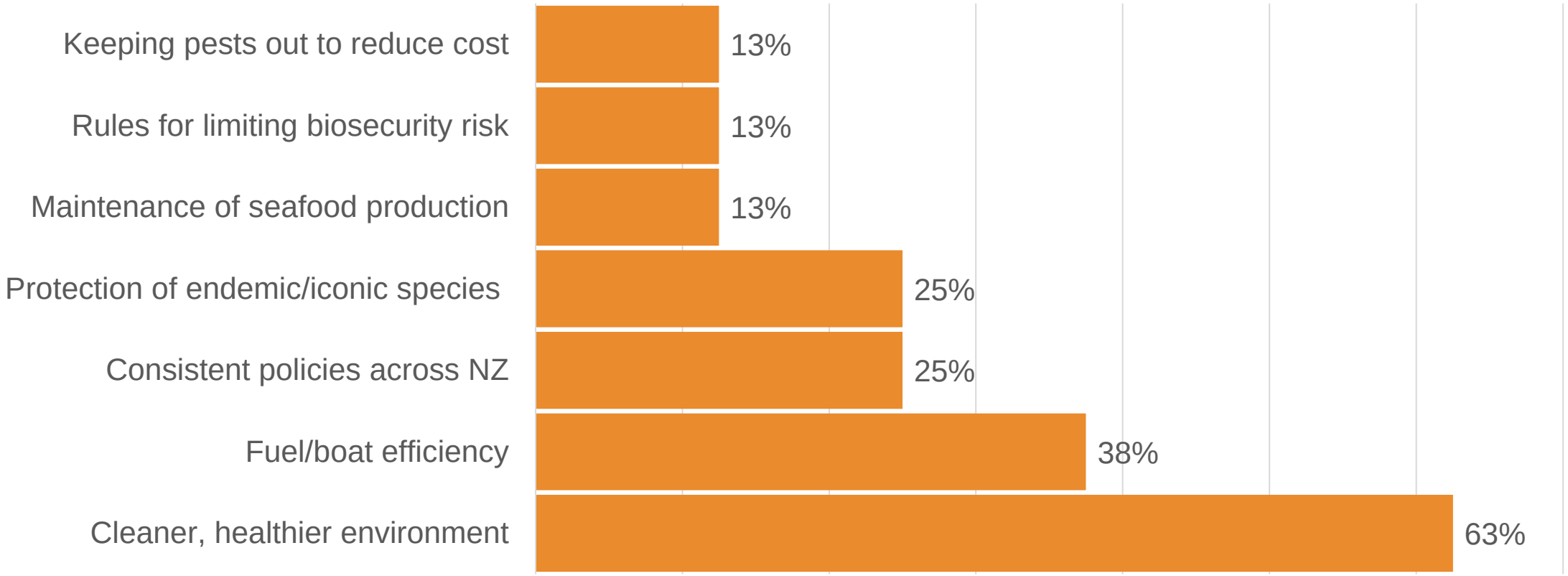
5. Costs of keeping hulls clean and other expenses



6. Time spent on boat and hull maintenance



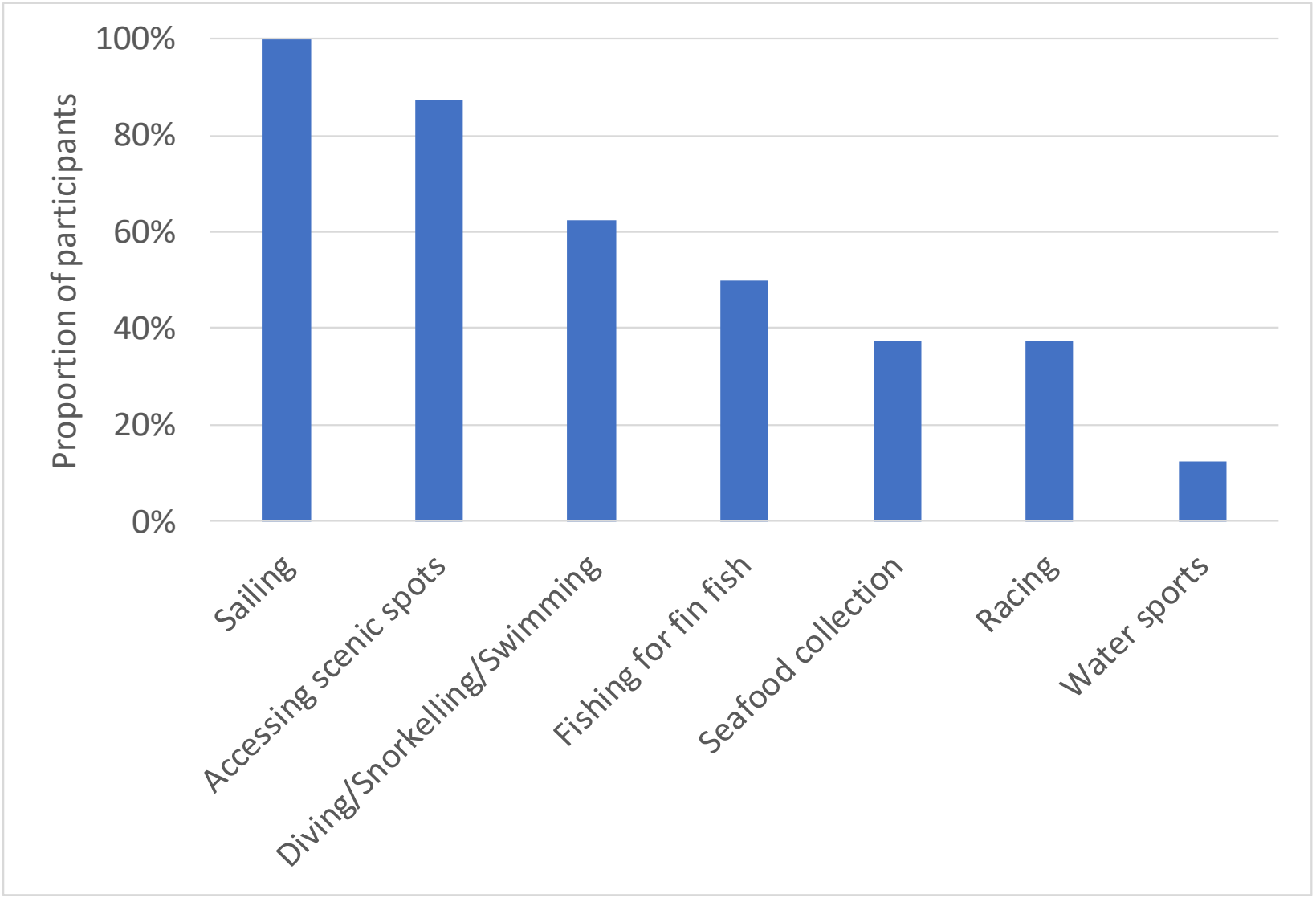
What outcomes would you like from a clean hull initiative?



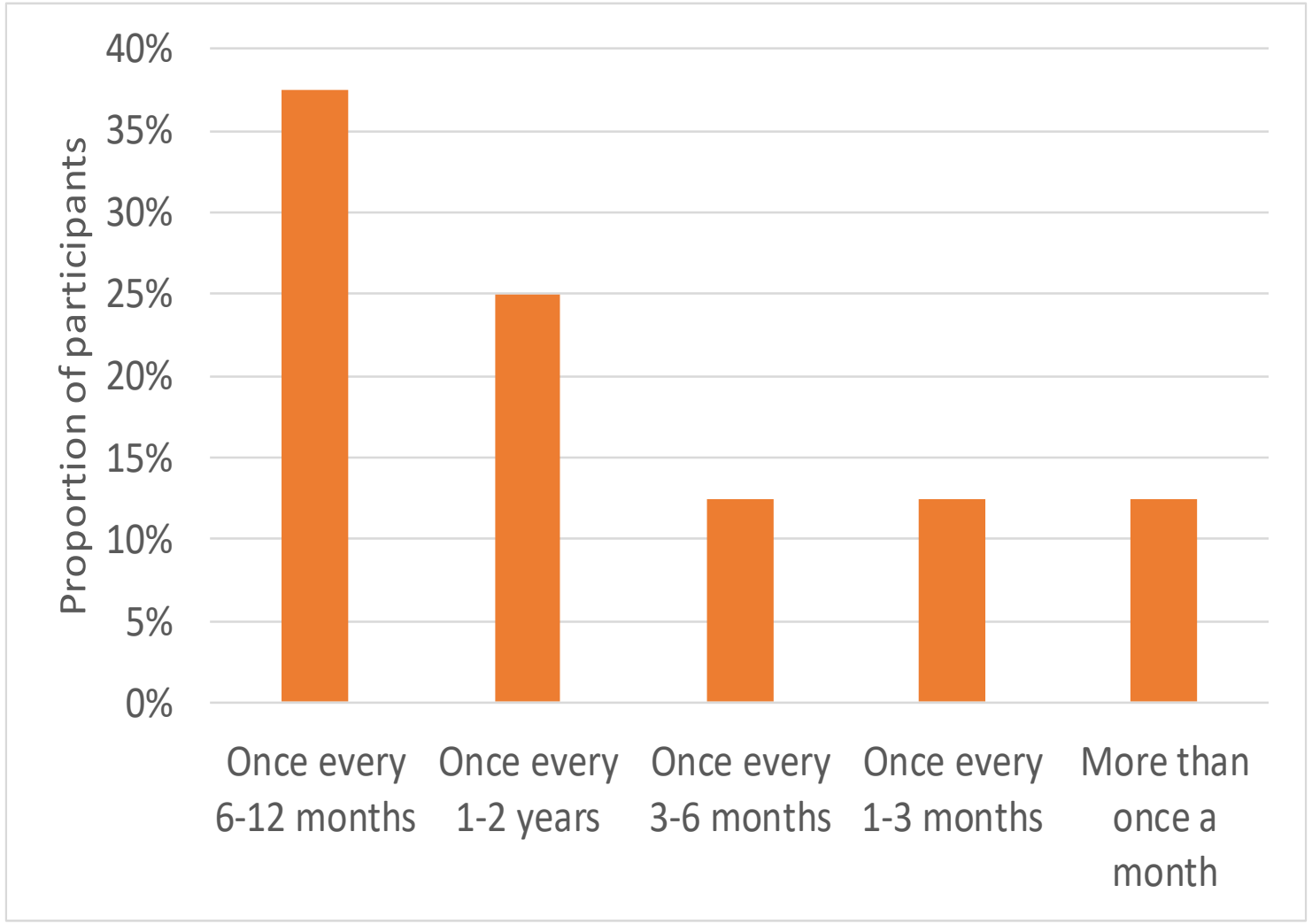
Cool-down questions

- Tested preliminary survey questions
  - questions were revised based on the responses
- Reponses allowed us to collect information on:
  - awareness of biofouling issues
  - types of boats owned
  - major recreational activities
  - how often biofouling organisms were removed from their boats
- All participants owned a boat greater than 7m which were always on water
- All were aware that boats spread pests

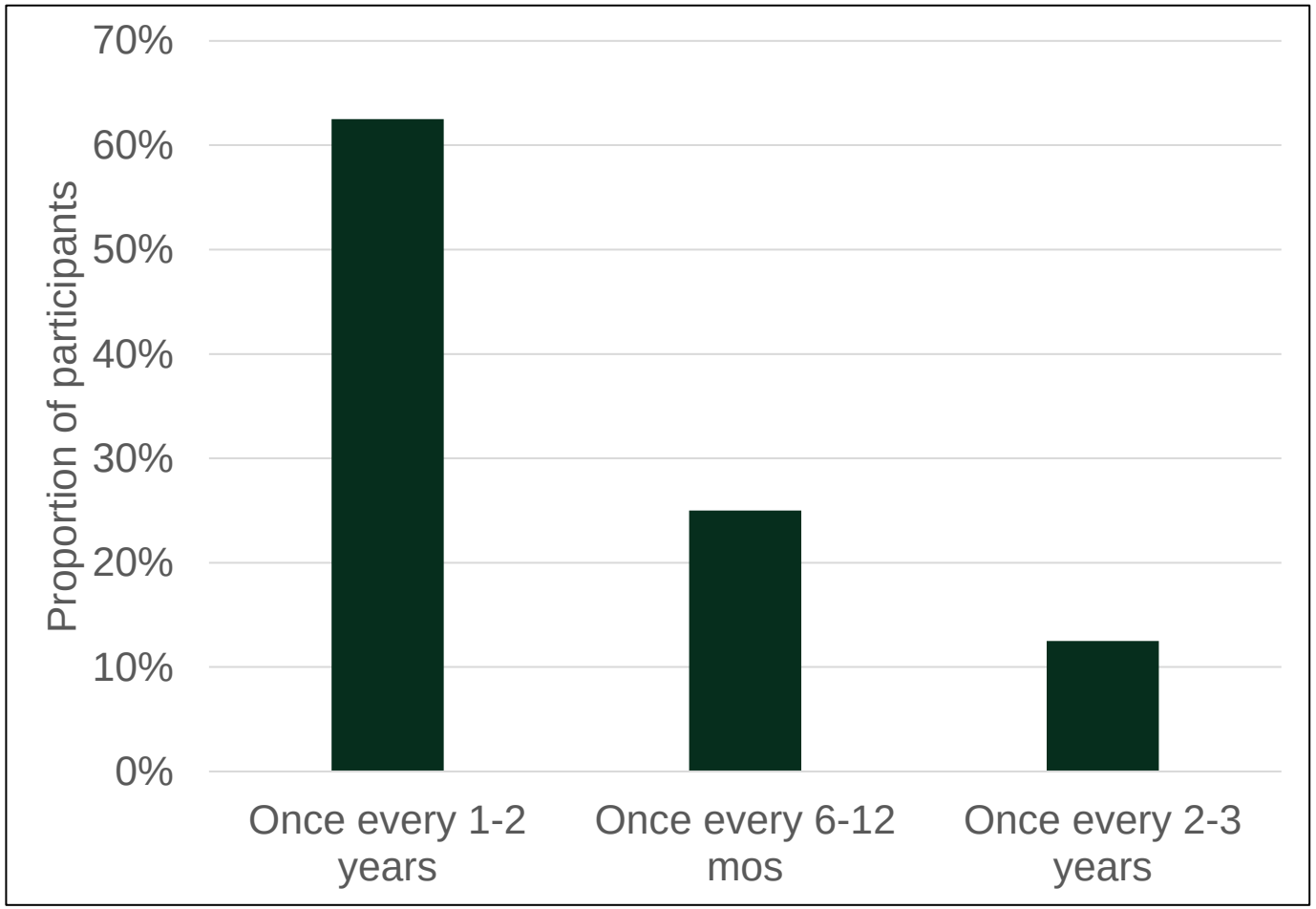
Participation in recreational activities



Frequency of removing biofouling organisms



Frequency of applying anti-fouling paint on boat hulls



Conclusion and where to next

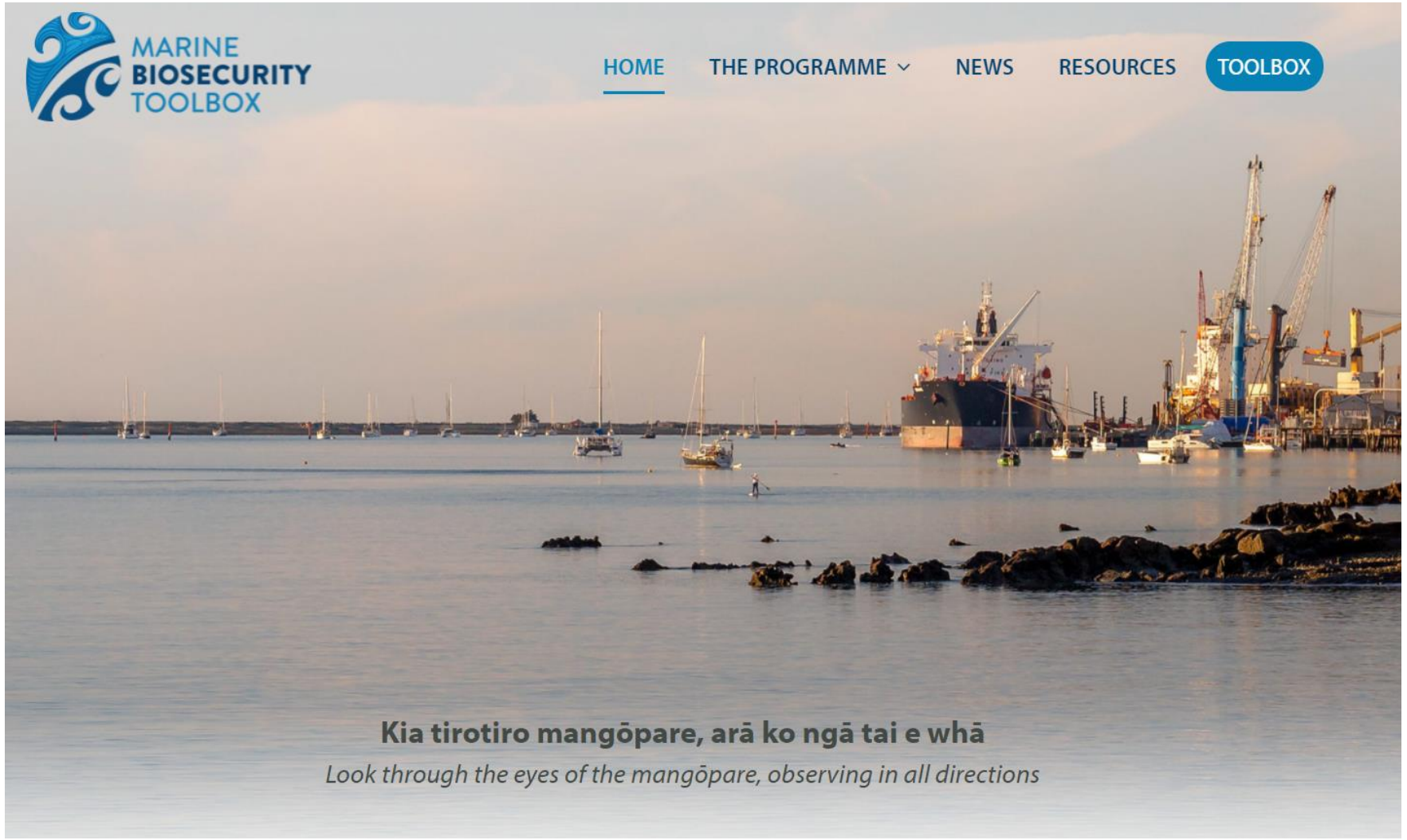
- Lit review, engagement with councils and focus group have been very helpful for our survey design
- Over the next few months, we will:
  - finalise survey instrument
    - choice experiment valuation scenario
    - TPB questions
    - one-on-one interviews
    - pre-testing of the questionnaire
  - compile, clean and analyse survey data
  - present results at a meeting/conference

Developing choice task

- We identified 6 attributes
  - ecosystem health and a boat issue
  - seafood collection/abundance
  - two payment vehicles ($ and time)
- TPB will help account for behavioural intentions of boat owners
- The survey instrument is being refined with government agencies, industry and boat owners
- A national survey of recreational boat owners will be rolled out over the next few months
- Comments welcome

Attribute	Status quo	Option A	Option B
Marine ecosystem health 	**Declining** limiting enjoyment of environments	**Improving** increasing enjoyment of environments	**Stable** constant enjoyment of environments
Boat maintenance & fuel cost 	**Increasing** cost of maintenance and fuel use	**Stable** cost of maintenance and fuel use	**Decreasing** cost of maintenance and fuel use
Iconic seafood species abundance 	**Declining** abundance of seafood species	**Improving** abundance of seafood species	**Stable** abundance of seafood species
NZ hull cleanliness policies 	**Different policies** across NZ regions	**One set of policies** across NZ regions	**Improved coordination between regions** policies vary based on risk
Additional annual payment in hull cleaning action ($/year) 	**$0**	**$100** per year for 5 years?	**$200** per year for 5 years?
Willingness to spend time on training for hull cleanliness 	**0 hours**	**32 hours** per year for 5 years	**16 hours** per year for 5 years
I would choose	◯	◯	◯

Thank you.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