

Economics Legislation Committee
ANSWERS TO QUESTIONS ON NOTICE
Industry Portfolio
Supplementary Budget Estimates 2014-15
23 October 2014

AGENCY/DEPARTMENT: Australian Institute of Marine Science

TOPIC: Climate Change Adaptation

REFERENCE: Written Question – Senator Waters

QUESTION No.: SI-126

1. Please provide as much detail as possible in relation to any projects related to “assisted evolution” including
 - a. Timeframe
 - b. Cost and FTE commitment
 - c. Sources of funding
 - d. Expected output
 - e. Whether approaches have been made to government or private organisations for funding
 - f. Detailed discussion of scope.
 - g. The species involved
 - h. The present habitat of those species
 - i. The proposed future habitat of those species
2. Are there any external stakeholders involved – i.e. tourism operators, university marine ecologists, industry representatives, UNESCO representatives?
3. In what capacity are they involved?
4. Is the project primarily motivated by ecological or aesthetic considerations?
5. Has any assessment been done of the potential ecological impacts of introducing outside species in particular sections of the GBR?
6. What were the conclusions of that assessment?
7. Please provide a copy of that assessment.
8. Does this project or projects fall under the Great Barrier Reef Climate Change Action Plan 2012-2017?

ANSWER

1. Over the last few years AIMS has undertaken a number of small pilot research projects associated with assisted evolution using a combination of appropriation and external funding. The objective was to assess if there was any potential for assisted evolution to facilitate GBR corals in adapting to climate change (ocean warming and acidification). To date the total AIMS investment is less than \$250k, including labour. AIMS has allocated a small budget (\$90k total cost) during 2014/15 to continue this work. There are no other projects budgeted at this time.

This initial research has determined that there may be technically viable methods, however effectiveness and risks are unknown. Funding has been applied for from the Paul G. Allen Family Foundation for a large 5 year project run at both the Hawai’i Institute of Marine Biology and AIMS. AIMS would not be contributing cash for this project, but would be providing an in-kind contribution through the utilisation of its experimental and analytical capabilities. This project still constitutes early phase research with many more steps being required (including detailed risk assessments) before AIMS would consider making any recommendations regarding adoption.

The following provides an overview of the proposed project, noting that this project is not yet funded or operational.

- a. 2015 to 2019
- b. Yet to be finalised, but in the order of \$5m (forecast and not yet committed).
- c. Paul Allen Foundation, AIMS Appropriation (in-kind, non-cash contribution).
- d. This five-year project is organised around three core activities: Building a Biological Toolkit, Promoting the Value of Assisted Evolution in Preserving and Restoring Reefs and Planning for Implementation. It aims to generate capacity to mitigate ocean acidification and ocean warming on reefs, to educate and raise awareness among invested users of reef resources, and to assemble an interdisciplinary team to plan for future coral assisted evolution projects. In addition to the important applied advances, this project will profoundly improve our basic understanding of the biology of corals.
- e. Private (Paul Allen Foundation and GBR Foundation).
- f. The overarching goal is to develop the biological capacity to enhance resilience of corals, in order to contribute to the preservation and restoration of coral reefs and sustain the human services that reefs provide. As a first step towards realising this goal, is a proof of concept project to assess if (human)-assisted evolution can be successfully applied to reef corals to generate stocks with extended functional range and resilience to acidified and warmer waters.

The project is proof-of-concept. At the end of the five years it is anticipated that it will be possible to determine which of the four proposed manipulations (Fig. 2) will be most feasible

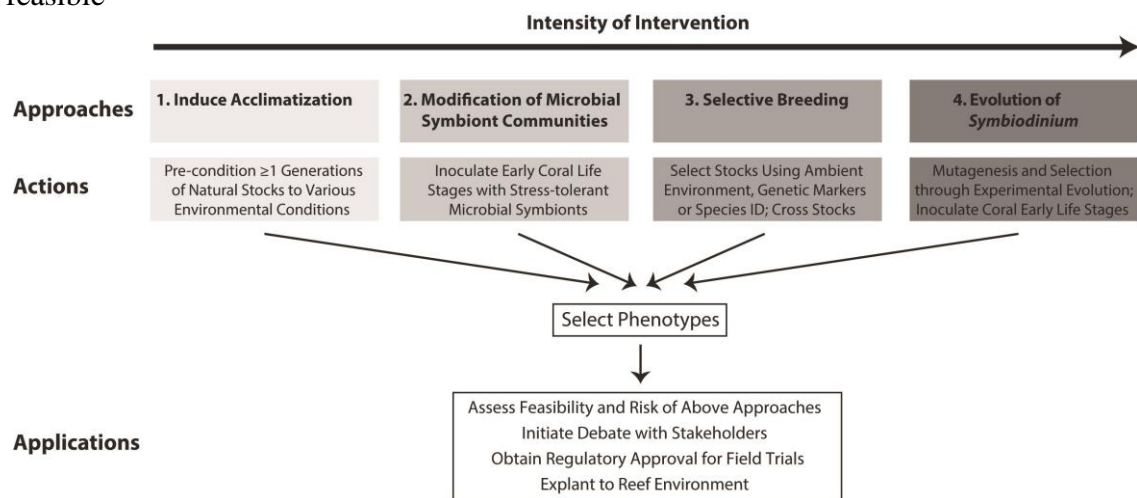


Figure 2: Diagram summarizing the rationale behind and steps involved in the four assisted evolution approaches proposed here for corals.

- g. Proposed are (but this may change slightly):
Hawaii: Pocillopora damicornis, Pocillopora meandrina, Montipora capitata, Porites compressa and Porites lobata (ALL the ecologically dominant species on reefs in Kaneohe Bay, Hawaii)
Australia: Pocillopora damicornis, Pocillopora acuta, Acropora millepora, Acropora selago, Acropora papillare, Acropora hyacinthus, Acropora cytherea and Platygyra spp.

- h.** These are all shallow-water reef-building corals.
- i.** Shallow-water reef areas, possibly also artificial structures that are being used for coastal protection.

2. Engagement with stakeholders is part of the proposed project (see response to question d). The project has been discussed at ReFuGe2020 workshops where GBRMPA representatives were present. Based on this, AIMS researcher Dr. van Oppen has been invited to participate in a GBRPMA workshop on ecosystem restoration/recovery techniques and options for marine and coastal areas, including their applications and feasibility within the Great Barrier Reef World Heritage Area (27 November 2014). The project was presented at the international Ocean Sciences Meeting in Hawaii in February 2014. Collaborators from universities will be part of various aspects the project if it gets funded. Existing collaborators relevant to the proposed work in Australia are Prof Phil Munday (CoECSR, JCU), Prof Bette Willis (CoECSR, JCU), Prof Ary Hoffmann (UoM).

3. Refer answer to question j.

4. Ecological considerations.

5. We are NOT proposing to introduce species from other parts of the world into the GBR. Translocation of species within the GBR, outside their current areas of location is also NOT proposed.

6. See answer under point m.

7. See answer under point m.

8. Some of the results from our pilot work are relevant to targeted research as stated in the GBR Climate Change Action Plan of “Map areas of high and low resilience to prioritise investment of management effort (e.g. identify and protect refugia for thermally tolerant coral species that will provide genetic stock for recovery)”. We have identified two genetic markers for environmental stress tolerance in the coral species *Acropora millepora* that can be used to map this trait across the GBR.

Other than this, the assisted evolution approaches to be explored are not specifically mentioned in the GBR Climate Change Action Plan. This research is extremely early phase and not yet at a point where consideration within action plans is appropriate.