# Explanations

## Debating the Environment Disadvantages

Due to the nature of the topic there are two different environment disads. The first one is the **Invasive Species disad**. This disad is only intended for Offshore Wind and Aquaculture affirmatives – since the link is based on development of the ocean. The second one is **Exploration disad.** This disad is only intended for the NOPP affirmative – since the link is (obviously) based on the exploration.

Students will need to make sure they use the correct sections to answer arguments.

### Invasive Species DA

**Description:** The basic story of the disadvantage is that case action harms biodiversity in the oceans and that leads to a cascade of extinctions that risks extinction.

For the **Offshore Wind** case, the link is that invasive species are attracted to the wind farms that are built offshore and that causes harm to biodiversity.

For **Aquaculture**, the link is that case introduces and facilitates invasive species that cause harm to biodiversity.

**Affirmative Answers:**

The primary affirmative responses suggest that the ongoing harms from multiple alternate causes, but primarily carbon emissions make damage to oceans inevitable through ocean acidification (non-unique) and that oceans and species are resilient.

**Terms:**

**Biodiversity**

**Invasive Species**

NSF, National Science Foundation, 2012 (“Stemming the Tide of Biodiversity Loss on Earth”, National Science Foundation”, September 24, <http://www.nsf.gov/news/news_summ.jsp?cntn_id=125495)//VP>)

The pace of discovery, however, is increasingly offset by the rapid and permanent loss of diversity. Reasons for biodiversity loss include climate change, over-exploitation of natural resources, "planetary re-engineering"--such as land-use change, water diversions, coastal development, fertilizer use--and the intentional or unintentional movements of species such that they become invasive. With biodiversity loss, humanity is losing links in the web of life that provide ecosystem services, forfeiting opportunities to understand the history and future of the living world and giving up opportunities for future beneficial discoveries in food, fiber, fuel, pharmaceuticals and bio-inspired innovation.

### Exploration DA

**Description:** The basic story of the disadvantage is that case action increases the amount of ocean exploration which causes unregulated exploration like bioprosepecting which hurts the ocean and turns the aff.

**Affirmative Answers:**

The primary affirmative response is that the aff’s ocean research is actually beneficial to the ocean, and that the research would be regulated.

**Terms:**

# Negative

## Invasive Species DA – 1NC

### 1NC – Offshore Wind

#### Experts agree that the ocean can be kept in good condition if we make an effort to prevent further harm

Jha 08 (Alok, science correspondent at the Guardian, “Total human impact on oceans mapped for the first time”, 2/14/08, The Guardian, <http://www.theguardian.com/science/2008/feb/14/ocean.ecosystems>)

Halpern said the results, which were published in the journal Science and presented yesterday to the American Association for the Advancement of Science annual meeting in Boston, still gave room for hope. "With targeted efforts to protect the chunks of the ocean that remain relatively pristine, we have a good chance of preserving these areas in good condition," he said.¶ Andrew Rosenberg, a professor of natural resources at the University of New Hampshire, who was not involved with the study, said: "Clearly we can no longer just focus on fishing or coastal wetland loss or pollution as if they are separate effects. These human impacts overlap in space and time, and in far too many cases the magnitude is frighteningly high."¶ He added: "The message for policy-makers seems clear to me: conservation action that cuts across the whole set of human impacts is needed now in many places around the globe."

#### Offshore wind creates habitats for invasive species --- destroys ocean biodiversity and causes fishery collapse.

**Langhamer 12 [**[Olivia Langhamer](http://www.hindawi.com/28064185/), December 2012. Department of Biology, Norwegian University of Science and Technology, Høgskoleringen. “Artificial Reef Effect in relation to Offshore Renewable Energy Conversion: State of the Art,” The Scientific World Journal, http://www.hindawi.com/journals/tswj/2012/386713/.]

One mitigating effect of offshore renewable energy on the local biodiversity may occur due to colonization by invasive species. Ever since international shipping started, marine organisms have been distributed all over the world by ballast water or as fouling on boat hulls. This introduction of alien species has dramatic ecological effects, since it can be a threat to global biodiversity [[52](http://www.hindawi.com/journals/tswj/2012/386713/#B52), [53](http://www.hindawi.com/journals/tswj/2012/386713/#B53)] and lead to local extinctions and fishery collapses [[53](http://www.hindawi.com/journals/tswj/2012/386713/#B53)]. Artificial hard substrates offer habitats for a large number of invasive species normally attached to rocky reefs [[54](http://www.hindawi.com/journals/tswj/2012/386713/#B55)]. In general, artificial structures do not host exactly the same species as a natural hard substrate [[55](http://www.hindawi.com/journals/tswj/2012/386713/#B56), [56](http://www.hindawi.com/journals/tswj/2012/386713/#B57)]. The installation of offshore renewable energy parks may not only introduce hard substrata in otherwise sandy-dominated bottoms, but can also provide new habitats for invasive species. Different hydrodynamics, such as more shelter due to new structures may lead to colonization of organisms very different to those on nearby hard substrates and thereby establish and spread nonindigenous species [[57](http://www.hindawi.com/journals/tswj/2012/386713/#B58)]. On wind turbine constructions in the North Sea and in the Baltic Sea the presence of alien species has been recorded [[58](http://www.hindawi.com/journals/tswj/2012/386713/#B59)–[60](http://www.hindawi.com/journals/tswj/2012/386713/#B61)] and may provide stepping-stones for spread, which could facilitate the establishment of the new taxa in the recipient region.

#### Biodiversity loss results in destruction of the Earth and extinction

Dingle 11 – Sarah Dingle is a reporter for ABC Radio Current Affairs. (“Ocean heading for mass extinction, scientists warn”, ABC News, <http://www.abc.net.au/news/2011-06-21/ocean-heading-for-mass-extinction-scientists-warn/2766340>, June 21, 2011)

Scientists are warning of a potential marine massacre with a mass extinction of sea life akin to the death of the dinosaurs. A new report says the seas are battling pollutants, overfishing and warming, and warns that without swift action the fight to save species could be lost. The International Program on the State of the Oceans report brought together coral reef ecologists, toxicologists and fisheries scientists. And when they compared notes, the result was grim. Co-author Professor Ove Hoegh Guldberg, who specialises in reef ecosystems, says scientists found "unprecedented warming". "We're seeing acidification in the ocean and now we're starting to see a drop in oxygen concentration throughout the major part of the ocean," he said. "Now it's impacting directly on sea life, but the other is that it is a potential early step towards conditions which are associated with so-called mass extinction events." Professor Guldberg does not want to be alarmist, but says a growing human population is to blame for many of the changes. He warns the pressure will only increase, with the world's population set to grow by another 3 billion people in the next 30 to 50 years. "As human populations have expanded in coastal areas – and it's really boomed throughout the world – you've had the modification of coastlines by the very fact that by destabilising vegetation you get nutrients and sediments going out in those coastal waters," he said. "That's had a tremendously damaging effect in our neighbourhood. In South-East Asia for example, the entire loss of marine ecosystems that used to be there and used to support people." Dr. Alex Rogers is the scientific director of the International Program on the State of the Oceans and a professor of conservation biology at Oxford University. He says when he got together with his colleagues they realised changes in ocean temperatures were occurring much faster than they had expected. "The changes that people had been predicting would happen in the lifetime of our children, or our children's children, are happening really now before our eyes," he said. Dead zones Professor Guldberg says concerns about marine environments often take a back seat both in public debate and scientific research. "They did a study last year where I counted the number of peer-reviewed papers on climate change on the land versus the sea and there were 20 more papers, 20 times as many papers, associated with problems on land versus the sea," he said. He says the sea provides up to a quarter of the world's protein and is concerned about the proliferation of dead zones if nothing is done. Dead zones are areas where oxygen levels in the water drop to zero, a condition known as anoxia. He says in these conditions only certain species survive. "It won't be fish that we like to eat. There are animals and plants - well in fact I shouldn't say animals but more plants and bacteria, green slime, that will prosper in the anoxic environment," he said. Professor Guldberg says the ocean is the life support system for the planet's atmosphere and if uncontrolled degradation continues, the threat of mass extinction is real and does not just apply to the sea. "If we barrel along as we are right now, there's an increasing risk that we will be entering into one of these mass extinction events," he said. "This is where you essentially get a runaway set of conditions which will be very unsustainable as far as human or any other life that we have on the planet today." "This comes back to the fact that the ocean is central to the climate and conditions across the entire planet." Professor Guldberg says to control the pace of change the world must move to zero emissions within the next 40 years. The report's findings will be presented at the United Nations headquarters in New York this week.

### 1NC – Aquaculture

#### Experts agree that the ocean can be kept in good condition if we make an effort to prevent further harm

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#### Link- Open ocean aquaculture undermines marine environment --- fish escapes and spread of waste and chemical byproducts

Wheeler, 13 --- J.D. Candidate 2013, Golden Gate University School of Law (Spring 2013, Garrett Wheeler, Golden Gate University Environmental Law Journal, “COMMENT: A FEASIBLE ALTERNATIVE: THE LEGAL IMPLICATIONS OF AQUACULTURE IN THE UNITED STATES AND THE PROMISE OF SUSTAINABLE URBAN AQUACULTURE SYSTEMS,” 6 Golden Gate U. Envtl. L.J. 295, JMP)

III. ENVIRONMENTAL PROBLEMS ASSOCIATED WITH AQUACULTURE

In the past decade, a new wave of industrial and governmental enthusiasm for ocean-based operations, particularly for offshore farms located in the 200-mile wide Exclusive Economic Zone (EEZ), n34 has [\*300] garnered attention as well as controversy. n35 Proponents n36 view open-ocean farms as playing a major role in solving the United States' $ 9 billion seafood trade deficit, n37 while opponents n38 warn of potentially devastating economic, social, and environmental consequences. n39

New technologies are allowing operators to cultivate fish and other seafood in exposed, open-ocean environments that were inaccessible only twenty years ago. n40 However, the rise of offshore aquaculture poses significant threats to sensitive marine environments and "represents a fundamental transition in the human claim on the Earth's surface." n41

Open-ocean aquaculture facilities operate in largely pristine areas and are intimately connected with their surrounding aquatic ecosystems. n42 Common species cultivated in the open ocean include mostly finfish such as salmon, cod, and tuna. n43 Large underwater cages are placed in the water, and as ocean currents flow through the cages, the spread of waste and chemical byproducts can implicate the health of the seafloor and the surrounding water column. n44 Escaped fish also pose a [\*301] threat to marine ecosystems by introducing non-indigenous species, compromising the genetic fitness of native populations through interbreeding, and disease translocation. n45 Disease and parasites may also spread to nearby native populations, and attempts by operators to apply drugs and chemicals to contain those threats can damage the surrounding ecosystem. n46 Predatory fish and marine mammals are also drawn to cages full of captive fish, leading to injury, death, and harassment by operators trying to protect their stocks. n47 Finally, operational failures are all but inevitable: in at least one instance, an entire fish cage broke free from a tow vessel and was sent floating adrift in the open ocean, endangering marine species as well as any ocean-going vessels unfortunate enough to cross its path. n48

Compared to the negative environmental impacts of ocean-based aquaculture facilities, the negative impacts of land-based systems are easily minimized. Unlike ocean-based operations, isolated terrestrial facilities have fewer problems with escapement. n49 The spread of disease is also easier to control because fecal matter and feed waste are not in direct contact with the surrounding marine ecosystem.

#### Biodiversity loss results in destruction of the Earth and extinction

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Scientists are warning of a potential marine massacre with a mass extinction of sea life akin to the death of the dinosaurs. A new report says the seas are battling pollutants, overfishing and warming, and warns that without swift action the fight to save species could be lost. The International Program on the State of the Oceans report brought together coral reef ecologists, toxicologists and fisheries scientists. And when they compared notes, the result was grim. Co-author Professor Ove Hoegh Guldberg, who specialises in reef ecosystems, says scientists found "unprecedented warming". "We're seeing acidification in the ocean and now we're starting to see a drop in oxygen concentration throughout the major part of the ocean," he said. "Now it's impacting directly on sea life, but the other is that it is a potential early step towards conditions which are associated with so-called mass extinction events." Professor Guldberg does not want to be alarmist, but says a growing human population is to blame for many of the changes. He warns the pressure will only increase, with the world's population set to grow by another 3 billion people in the next 30 to 50 years. "As human populations have expanded in coastal areas – and it's really boomed throughout the world – you've had the modification of coastlines by the very fact that by destabilising vegetation you get nutrients and sediments going out in those coastal waters," he said. "That's had a tremendously damaging effect in our neighbourhood. In South-East Asia for example, the entire loss of marine ecosystems that used to be there and used to support people." Dr. Alex Rogers is the scientific director of the International Program on the State of the Oceans and a professor of conservation biology at Oxford University. He says when he got together with his colleagues they realised changes in ocean temperatures were occurring much faster than they had expected. "The changes that people had been predicting would happen in the lifetime of our children, or our children's children, are happening really now before our eyes," he said. Dead zones Professor Guldberg says concerns about marine environments often take a back seat both in public debate and scientific research. "They did a study last year where I counted the number of peer-reviewed papers on climate change on the land versus the sea and there were 20 more papers, 20 times as many papers, associated with problems on land versus the sea," he said. He says the sea provides up to a quarter of the world's protein and is concerned about the proliferation of dead zones if nothing is done. Dead zones are areas where oxygen levels in the water drop to zero, a condition known as anoxia. He says in these conditions only certain species survive. "It won't be fish that we like to eat. There are animals and plants - well in fact I shouldn't say animals but more plants and bacteria, green slime, that will prosper in the anoxic environment," he said. Professor Guldberg says the ocean is the life support system for the planet's atmosphere and if uncontrolled degradation continues, the threat of mass extinction is real and does not just apply to the sea. "If we barrel along as we are right now, there's an increasing risk that we will be entering into one of these mass extinction events," he said. "This is where you essentially get a runaway set of conditions which will be very unsustainable as far as human or any other life that we have on the planet today." "This comes back to the fact that the ocean is central to the climate and conditions across the entire planet." Professor Guldberg says to control the pace of change the world must move to zero emissions within the next 40 years. The report's findings will be presented at the United Nations headquarters in New York this week.

## Invasive Species DA – 2NC/1NR

### They Say: “Oceans Improving”

#### Coral reefs are recovering- reefs are moving to undisturbed depths

CNN 12 (Cable News Network, “Great Barrier Reef found to have thriving deep water coral” CNN, 10/26/12 http://www.cnn.com/2012/10/26/world/asia/australia-deep-water-coral-reef/)//BLOV

(CNN) -- A recent survey of the Coral Sea and Great Barrier Reef has found coral flourishing in deep waters, a stark contrast to the shallower reefs that have seen a drastic decline over the last few decades. The healthy coral populations were discovered to be below 30 meters -- beyond the usual reach of most scuba divers -- and even found at depths of 80 meters, according to the Catlin Seaview Survey. "The Holmes and Flinders Reefs in the Coral Sea are renowned for having been badly damaged, said Pim Bongaerts, of the University of Queensland's Global Change Institute, who was leading the deep reef survey. "Yet we have found their deep reef zone is hardly disturbed at all. In fact the most striking thing is the abundance of coral on the deep reef. What has blown me away is to see that even 70 to 80 meters down, there are significant coral populations." Earlier this month a report, by the Australian Institute of Marine Science (AIMS) and the University of Wollongong, revealed that the Great Barrier Reef had lost half its coral cover in the last 27 years. Researchers say most of the damage to the shallower coral was wrought in recent years by a succession of powerful cyclones. Other threats that are hindering its ability to recover include the crown-of-thorns starfish, or COTS, a native species which feeds on coral, and coral bleaching that occurs when water becomes too warm. The deep reef survey team used remote operated vehicles able to reach depths of 100 meters, giving scientists a new view of hitherto unexplored reefs. "It is surprising in this day and age, that below some of the most well-known reefs, which are so popular with divers, there is an almost entirely unexplored world and as a result an enormous amount of science to be done," said Bongaerts. So far the team has completed four of its ten planned surveys at areas along the length of the 2,300 kilometer-long reef system and outlying atolls. Bongaerts believes that the deep-water reefs might be able to help the shallower ones recover, as they have been seen to live in both depths of water. "At the moment we know little about the extent of larval movements between the shallow and deep reef, but we are seeing species that exist in both zones," he said. "There are clear differences we're observing. Corals are much flatter, more plate-like than the branching and domed shapes seen nearer the surface. This is the corals responding to the reduced light conditions and spreading out to maximize their exposure to light. So far below the surface, the light is blue because all other parts of the spectrum have been filtered out. It is a monochrome world until you turn on strong lights to reveal amazing, beautiful, fantastic colors."

#### The world is increasing conservation – MPAs and NTAs

UNEP 08 (United Nations Environment Program, “National and Regional Networks of Marine Protected Areas: A Review of Progress”, UNEP World Conservation Monitoring Centre, p. i-ii, http://www.unep.org/regionalseas/publications/otherpubs/pdfs/MPA\_Network\_report.pdf)

Most national ecological MPA networks being planned comprise a range of different types of MPAs including both NTAs and multiple use sites. In several countries, such as Belize, Cuba, and Mexico, MPAs are part of a broad conservation planning process to develop a national protected area system plan. In other countries and territories, such as South Africa, Tanzania, Rodrigues (Mauritius), USA and Canada, MPA networks are being developed separately from, although sometimes in coordination with, the process being used to establish terrestrial protected area systems. Where MPA management is devolved to state or local-level governments, MPA networks are generally being planned using a hierarchical approach, with small networks nested within larger national networks, as in Mexico, Indonesia, Australia, and the USA. This approach can however lead to a lack of harmonisation, as seen in Australia, where the state of Victoria is establishing a system of NTAs only, whereas other states and the Commonwealth are including multiple use MPAs in their networks. Increasingly, NTA networks are being developed as part of the zonation of multiple use MPAs, particularly large ones such as the Great Barrier Reef Marine Park in Australia, the SeaFlower MPA in the San Andrés Archipelago, Colombia, the Channel Islands Marine Sanctuary in California, or as an integral part of a broader coastal management plan as on Socotra Island in Yemen. The South-east region MPA System Plan in Australia demonstrates how an MPA network can be integrated into a range of broader measures, such as recovery plans for listed species, fishery management closures and regulations for oil and gas activities. Belize demonstrates how a national MPA network can be part of not only a national integrated coastal management plan but also a regional MPA network (the Mesoamerican Barrier Reef), which incorporates international protected area designations, such as World Heritage Site (WHS).

### They Say: “Aquaculture Improves Biodiversity”

#### Aquaculture decimates the environment

DSF 10 (David Suziki Foundation, “Aquaculture”, David Suziki Foundation, 2010, http://www.davidsuzuki.org/issues/oceans/science/sustainable-fisheries-and-aquaculture/what-is-aquaculture/)

Like any form of industrial production, aquaculture has environmental impacts. The major impacts for the aquaculture industry include: using more fish than they produce, disease and parasite transfer, the introduction and spread of exotic species, chemical pollution, habitat destruction for farm siting or due to farm activities, and the killing of predators that prey on the farmed species. For aquaculture, impact is dictated by three main factors which include: 1) Species in production The higher the trophic level or food web position of the species being cultured the more inputs of feed will be required and thus more waste outputs will be released. 2) Location of production The more ecologically sensitive the location of the farm such as mangroves, coastal estuaries, salmon migration routes, etc. the more likely there will be an impact on the environment due to farm outputs such as waste, amplified disease or parasites, escapes of cultured stock, or killing of predators. 3) System of production. The more open the production system (e.g. open net pens) the more likely it is to have an impact on the environment. For example, open net pens are completely open and in anything that happens in the farm can be transferred to outside of the farm whereas closed containment systems contain all inputs and outputs. To illustrate this with some examples, an example of an aquaculture system that has a high impact is salmon farming. It farms a high trophic level species in open net pens that are located on wild salmon migrations in BC's coastal ecosystems.

#### Aquaculture introduces invasive species and medicines that disrupt native ecosystems

Porchas and Martinez-Cordova 11 (Marcel Martinez-Porchas Department of Food Technology of Animal Research Centre in Food and Development, Km 0.7 Carretera La Victoria, Hermosillo, SON, Mexico AND Luis R.Martinez-Cordova Department of Scientific and Technological Research of the University of Sonora, Luis Donaldo Colosio Boulevard s / n, 83000, Hermosillo, SON, Mexico “World Aquaculture: Environmental Impacts and Troubleshooting Alternatives” The ScientificWorld Journal Volume 2012, Article ID 389623 10/08/11 downloads.hindawi.com/journals/tswj/2012/389623.pdf)//BLOV

(5) Ecological Impacts in Natural Ecosystems because of the Introduction of Exotic Species. The negative impacts of the “biological contamination” for the introduction of exotic aquacultural species on the native populations have been well documented [18, 38, 39]. The main reported problems are the displacement of native species, competition for space and food, and pathogens spread. To cite an example, recent reports have revealed a parasite transmission of sea lice from captive to wild salmon [40]. The authors of such study have hypothesized that “if outbreaks continue, then local extinction is certain, and a 99% collapse in pink salmon abundance is expected in four salmon generations.” (6) Ecological Impacts Caused by Inadequate Medication Practices. Farmers usually expose their cultured organisms to medication regimes, for different purposes such as avoiding disease outbreaks and improving growth performance.However, monitoring studies have detected low or high levels of a wide range of pharmaceuticals, including hormones, steroids, antibiotics, and parasiticides, in soils, surface waters, and groundwaters [41]. These chemicals have caused imbalances in the different ecosystems. In particular, the use of hormones in aquaculture and its environmental implications have been scarcely studied.

### They Say: “Offshore Wind Improves Biodiversity”

#### Offshore wind facilitates invasive species and disrupts ecosystems through construction, sound pollution, and electromagnetic interference.

Walter Musial, September 2010. Marine energy researcher and principal engineer for the [National Renewable Energy Laboratory's](http://www.deepcwind.org/component/weblinks/34/8) ([NREL](http://www.deepcwind.org/deepcwind-consortium-blog/47-musial-presentation)) National Wind Technology Center. “Large-Scale Offshore Wind Power in the United States: Assessment of Opportunities and Barriers,” National Renewable Energy Laboratory, Google Books, p. 191-2.

A few studies demonstrating a range of results have been published on the effects of offshore wind farms on the fish and benthic communities. Possible direct and indirect effects of a wind plant include:

-Temporary disturbance or long-term elimination of benthic communities from construction activities

-Changes in species composition and species numbers

-New habitat (e.g., artificial reefs, shellfish beds) serving as habitat for invasive species

-Hearing impairment in fish from low-frequency, hydrodynamic/acoustic fields from the wind turbines

-Changes in habitat conditions as a result of altered sedimentation and current

-Impacts to elamobranchs and other marine species caused by electromagnetic fields from transmission lines

One study of the fish and benthic communities in a Swedish wind farm in the Baltic Sea ground increased numbers of demersal fish and blue mussels around the turbines but lower concentrations of algae compared with other areas (Wilhelmsson, Malm, and Ohman 2006). Another study conducted on Swedish wind farms in the Baltic Sea found increases in the biomass of blue mussels and motile crustaceans but decreases in the biomass of algae compared with sites farther away from the turbines (Wilhelmsson and Malm 2008). Invasive species have also been documented on wind turbines in both Danish (DONG Energy et al. 2006) and Swedish offshore wind farms (Wilhelmsson, Malm, and Ohman 2006).

Sounds transmitted through the water by wind farm construction, operation, and maintenance may also affect marine animals. A study conducted by the UK Department of Energy and Climate Change found that sounds generated by offshore wind turbines are in the same range of frequencies as those generated by existing shipping, fishing vessels, wind, and waves, and therefore would contribute only a relatively low background noise (during operation) to the preexisting noises (see Table 8-2 for a list of various anthropogenic sounds). During construction and decommissioning, placing and removing the monopole structures creates noise. During the operation phase, 20 years in most cases, offshore wind turbines produce sound through the movement of the rotor blades and gearbox and vibration of the structure, creating three paths for sound movement--through the air, water, and ground.

Adverse effects to fish caused by noise include physiological stress and such as increase in cortisol, hearing impairment, and behavioral changes (Kikuchi 2009). Although a 2003 report from an offshore wind farm in Norgersund demonstrated no negative impacts on fish caused by noise (ETNWE 2003), other studies demonstrate the opposite. Significant data gaps do, however, exist (Simmond and Dolman 2008). A recent laboratory study examined the swimming behaviors of two native species of fish (roach, three-spines stickleback) and their reactions to single-frequency sounds and noise generated by an offshore wind turbine in the Baltic Sea (Andersson et al. 2007a, Andersson et al. 2007b). The roach exhibited escape behavior and the three-spines sticklebacks exhibited twitching behavior (Andersson et al. 2007b).

### They Say “Invasive Species Don’t Spread”

#### Invasive species spread is inevitable BUT the key factor is whether they have habitats to establish their position in new environments --- invasive species will then destroy ecosystems and spread disease.

[Nicholas Bax](http://www.sciencedirect.com/science/article/pii/S0308597X03000411) et al, July 2003. CSIRO, Centre for Research on Introduced Marine Pests (CRIMP), Hobart, Tasmania, Australia. “Marine invasive alien species: a threat to global biodiversity,” Marine Policy, 27.4.

Marine invasions are not just historical. At any given moment some 10,000 different species are being transported between bio-geographic regions in ballast tanks alone [[1]](http://www.sciencedirect.com/science/article/pii/S0308597X03000411#BIB1). And ballast water is just one of an ever-expanding list of vectors that mirror the worldwide expansion in trade and tourism [[2]](http://www.sciencedirect.com/science/article/pii/S0308597X03000411#BIB2) and [[3]](http://www.sciencedirect.com/science/article/pii/S0308597X03000411#BIB3). Fortunately, most of these potential invaders die. Many species cannot survive the dark and often dirty conditions in ballast tanks over a long voyage; for others, the environmental conditions at the port of discharge are not suitable. Even when conditions are apparently suitable, most organisms fail to establish, and of those that do establish most fail to become invasive—although some may become invasive after decades (or centuries) of otherwise unremarkable existence [[4]](http://www.sciencedirect.com/science/article/pii/S0308597X03000411#BIB4). Nonetheless, as ballast water has become cleaner, ship's transit speeds have increased, and environmental management of ports has improved, marine organisms are likely to find commercial shipping and other vectors increasingly hospitable means of transport worldwide. Reflecting these factors, the rate at which foreign organisms are establishing in ports worldwide has increased dramatically. New estuarine and marine species have been establishing once every 32 (San Francisco Bay) to 85 weeks in six studied ports in the US, Australian and NZ, and the rate of establishment appears to be increasing [[5]](http://www.sciencedirect.com/science/article/pii/S0308597X03000411#BIB5). Scientists and policy makers increasingly see the introduction of alien species as a major threat to marine biodiversity and a contributor to environmental change. As these marine introductions, intentional and accidental, can result from numerous human mediated activities, management responses need to cover a diverse range of human activity. In this paper, we briefly describe the environmental impacts, and economic and social implications, of some of the more invasive alien marine species, then we describe the vectors responsible for moving marine species around the world, emphasizing that ballast water is only one of many vectors. Lastly, we describe the international and domestic policy environment including the current international instruments that apply to the invasive species problem and recommend what actions need to be taken to reduce the risk of future invasions. 2. Brief overview of impacts 2.1. Biological impacts Two hundred and fifty two introduced and cryptogenic marine and estuarine species have been identified in Australia [[5]](http://www.sciencedirect.com/science/article/pii/S0308597X03000411#BIB5), more than 150 alien species in Port Phillip Bay alone [[6]](http://www.sciencedirect.com/science/article/pii/S0308597X03000411#BIB6). New Zealand scientists identified 159 alien marine species [[7]](http://www.sciencedirect.com/science/article/pii/S0308597X03000411#BIB7) while 212 alien marine, estuarine and freshwater species have been reported in the San Francisco Bay and Delta, California [[8]](http://www.sciencedirect.com/science/article/pii/S0308597X03000411#BIB8). In Hawaii, 91 of the nearly 400 marine species present in Pearl Harbor are alien [[9]](http://www.sciencedirect.com/science/article/pii/S0308597X03000411#BIB9). Based on historical data, a new marine or estuarine species establishes itself every 32–85 weeks in each of six ports studied in the US, New Zealand and Australia, a rate that appears to be increasing [[5]](http://www.sciencedirect.com/science/article/pii/S0308597X03000411#BIB5). While many of the alien species become part of the background flora and fauna, others become invasive, reaching densities of 1000 s m−2, and come to dominate the native flora and fauna. Virtually every coastal habitat in the San Francisco Bay area is now dominated by one or more alien species. Three of the six most common benthic marine species in Port Phillip Bay in 1996 were alien species, a statistic that does not include two recent and rapidly proliferating alien species, one of which—the North Pacific seastar, Asterias amurensis—has increased to over 100 million individuals covering 1500 km2 that have a greater biomass than that of all fished species in the Bay ( [Fig. 1](http://www.sciencedirect.com/science/article/pii/S0308597X03000411#FIG1)). In the 15 years since its discovery off Monaco, the invasive green algae, Caulerpa taxifolia, has come to cover 97% of available surfaces between Toulon and Genes (France, Monaco and Italy) has already been spread to the Adriatic Sea, and is projected to eventually spread over most of the Mediterranean [[10]](http://www.sciencedirect.com/science/article/pii/S0308597X03000411#BIB10). The numerical dominance of invasive alien marine species swamps native species and alters ecosystem services. In the Black Sea, an invasive comb jelly, Mnemiopsis leidyi, has been blamed for the collapse of coastal fisheries worth many millions of dollars annually [[11]](http://www.sciencedirect.com/science/article/pii/S0308597X03000411#BIB11). The Asian clam Potamocorbula amurensis, now reaches densities of over 10,000/m2 in San Francisco Bay, and has been blamed for the collapse of local fisheries. An invasive crab, Carcinus maenas, a European species now found in Australia, Japan, South Africa and both coasts of North America, is blamed for the collapse of bivalve fisheries on the North American east coast, and it is it feared will outcompete migratory bird populations on the west coast of North America for favoured shellfish [[12]](http://www.sciencedirect.com/science/article/pii/S0308597X03000411#BIB12). While the majority of marine alien invasive species have been found in the tidal and subtidal zones, at least one—the New Zealand screwshell, Maoricolpus roseus, introduced to Tasmania from New Zealand in the 1920s—has spread across the continental shelf at densities of 1000 s m–2 as far north as Sydney. This 5-cm long screwshell, changes the seabed habitat, covering soft sediments with its hard shell, providing attachment points for other marine fauna (including another invasive alien marine species, Undaria pinnatifida), and once dead, its shell provides abundant homes for a particular hermit crab that can use its heavy tapered shell, thus shifting the pre-invasion food web. Ballast water is also capable of transporting viral and bacterial pathogens, including the bacteria that cause cholera [[13]](http://www.sciencedirect.com/science/article/pii/S0308597X03000411#BIB13) and the resistant cysts of toxic dinoflagellates that can lead to harmful algal blooms and shellfish poisoning. Ballast water and other vectors can carry invasive alien marine species that are intermediate hosts for parasites affecting humans—e.g. the Chinese mitten crab that has invaded Europe and the US West coast is an intermediate host of the human liver fluke.

#### This outweighs the biodiversity benefits of creating new habitats.

[Nicholas Bax](http://www.sciencedirect.com/science/article/pii/S0308597X03000411) et al, July 2003. CSIRO, Centre for Research on Introduced Marine Pests (CRIMP), Hobart, Tasmania, Australia. “Marine invasive alien species: a threat to global biodiversity,” Marine Policy, 27.4.

The far-reaching impacts of invasive species have the potential to impact most marine conservation programs and they need to be considered as part of the planning for those programs. The conservation value of marine protected areas, for example, will be highly compromised by alien species invading, modifying the habitat and driving out native species. Caulerpa taxifolia now encroaches on many marine reserves in the Mediterranean, smothering existing habitat and replacing native seagrasses, reducing the reserve's conservation value [[10]](http://www.sciencedirect.com/science/article/pii/S0308597X03000411#BIB10) and [[27]](http://www.sciencedirect.com/science/article/pii/S0308597X03000411#BIB27). In Tasmania (Australia) the bizarre situation has been reached where an invasive marine macroalga (Undaria pinnatifida) is protected where it occurs in marine reserves, because these are no-take zones. This raises the question of what are the conservation goals for these marine protected areas, and the inadequacy of marine reserves that are not part of a broader conservation strategy including minimizing the risk of introducing and spreading invasive alien marine species [[33]](http://www.sciencedirect.com/science/article/pii/S0308597X03000411#BIB33).

The role of invasive species in structurally altering habitat, compromises the value of habitat conservation programs. While the impacts of fishing on benthic habitat are well documented [[34]](http://www.sciencedirect.com/science/article/pii/S0308597X03000411#BIB34) and increasingly the focus of environmental management, little is known and no one is considering managing an invasive marine gastropod from New Zealand—the New Zealand screwshell, Maoricolpus roseus—that smothers the bottom out to 80 m depth and changes the seabed from one of fine sand to a dense cover of live and dead shells [[35]](http://www.sciencedirect.com/science/article/pii/S0308597X03000411#BIB35). A systematic approach is needed to first determine the diversity and scale of manageable threats to the marine environment before embarking on single-issue management [[36]](http://www.sciencedirect.com/science/article/pii/S0308597X03000411#BIB36).

### They Say: “Alt Causes To Biodiversity”

#### Ocean Development destroys the marine environment

Underwood 92 (Peter C., a member of the Transactional & Securities Practice Group, HE MARINE ENVIRONMENT AND OCEAN DEVELOPMENT IN THE EASTERN CARIBBEAN, A New Law of the Sea for the Caribbean: Chapter 5, Vol.27, p.138-9, 1992 http://www.agu.org/books/ln/v027/LN027p0112/LN027p0112.pdf)

Despite the potential importance of marine resources and the threat of pollution, particularly oil, on these resources, adequate managerial and custodial policies are greatly lacking. The major reasons given for this situation are that: a) national economic problems often overshadow environment considerations, b) marine pollution has not been identified as a major problem; and c) there is a lack of awareness of the potential carnage to marine ecosystems by coastal development activities. In the Eastern Caribbean, where the people are turning more and more to marine resources for their economic well being, there is real reason to be concerned over potential 1 40 ecological damage.

#### Ocean development increases marine destruction

Mouat et al 07 (Mouat, William G. Kepner, Judith M. Lancaster, Associate Research Professors, Research Ecologist for the EPA, undergraduate qualifications in law and nursing and postgraduate qualifications in bioethics, “Environmental Change and Human Security”, NATO Science for Peace and Security Series, Section 2, p. 111-112, 2007, http://books.google.com/books?id=4\_-DL3AKjyIC&pg=PA110&lpg=PA110&dq=consequences+extinction+human+%22ocean+development%22&source=bl&ots=ZEuLkWZ5MF&sig=iPO9cDVtbCHMZ7I3ixTfZXDvwxo&hl=en&sa=X&ei=sVG0U5fBI82PqAa0iIHwCQ&ved=0CDMQ6AEwAg#v=onepage&q=consequences%20extinction%20human%20%22ocean%20development%22&f=false)

The characteristics and resources that the ocean possesses have been utilized and developed by humans since ancient times. But in recent times with the increasing reliance on marine resources and increases in all types of pollution that occur with human activities, conservation of the marine environment has become an important issue. Since regional ocean surveys tend to be conducted in seas near developed countries, the overall picture of the state of global marine pollution is not necessarily clear. Nevertheless, in closed seas such as the North Sea, Baltic Sea. Black Sea, and Mediterranean Sea, the occurrence of red tide is increasing, along with pollution from hazardous substances such as heavy metals (Vadineanu. 2000). Moreover, because the threat of major marine pollution exists from supertanker navigation and the development of sea bottom oil fields, and because damage incurred from the occurrence of a single accident can spread over large areas for a long period of time, conservation of the marine environment has received global attention. In particular, a succession of major oil spills in recent years caused by ENVIRONMENTAL CHANGE AND CONSERVATION supertanker accidents, and large-scale oil spills that occurred during the Gulf War at the end of the twentieth century, have had serious effects on the marine environment. Again reminding international opinion of the importance of marine environment conservation.

### They Say: “No Impact to Biodiversity”

**Biodiversity loss would lead to end of human life.**

Buczynski, writer @ Care2, 10 (Beth, 10/18/10, “UN: Loss Of Biodiversity Could Mean End Of Human Race”, Care2, <http://www.care2.com/causes/un-humans-are-rapidly-destroying-the-biodiversity-ne.html>, accessed 7/12/14, KW)

UN officials gathered at the Convention on Biological Diversity (CBD) in Japan have issued a global warning that the rapid loss of animal and plant species that has characterized the past century must end if humans are to survive.¶ “Business as usual is no more an option for mankind,” CBD executive secretary Ahmed Djoghlaf said in his opening statements. “We need a new approach, we need to reconnect with nature and live in harmony with nature into the future.”¶ As Djoghlaf acknolwedged in his opening statements, facing the fact that many countries have ignored their obligation to these goals is imperitive if progress is to be made in the future.¶ “Let us have the courage to look in the eyes of our children and admit that we have failed, individually and collectively, to fulfil the Johannesburg promise made to them by the 110 Heads of State and Government to substantially reduce the loss of biodiversity by 2010,” Djoghlaf stated. “Let us look in the eyes of our children and admit that we continue to lose biodiversity at an unprecedented rate, thus mortgaging their future.”¶ Earlier this year, the U.N. warned several eco-systems including the Amazon rainforest, freshwater lakes and rivers and coral reefs are approaching a “tipping point” which, if reached, may see them never recover.¶ According to a study by UC Berkeley and Penn State University researchers, between 15 and 42 percent of the mammals in North America disappeared after humans arrived. Compared to extinction rates demonstrated in other periods of Earth’s history, this means that North American species are already half way to to a sixth mass extinction, similar to the one that eliminated the dinosaurs.¶ The same is true in many other parts of the world. The third edition of the Global Biodiversity Outlook demonstrates that, today, the rate of loss of biodiversity is up to one thousand times higher than the background and historical rate of extinction.¶ The Earth’s 6.8 billion humans are effectively living 50 percent beyond the planet’s biocapacity in 2007, according to a new assessment by the World Wildlife Fund that said by 2030 humans will effectively need the capacity of two Earths in order to survive.

**Deontological Impact**

#### Prefer environment impacts—there’s an invisible threshold and it is irreversible

Diner 94 (Major David N., Judge Advocate General's Corps – United States Army, “The Army and The Endangered Species Act: Who's Endangering Whom?”, Military Law Review, Winter, 143 Mil. L. Rev. 161, Lexis)

The prime reason is the world's survival. Like all animal life, humans live off of other species. At some point, the number of species could decline to the point at which the ecosystem fails, and then humans also would become extinct. No one knows how many [\*171]  species the world needs to support human life, and to find out – by allowing certain species to become extinct -- would not be sound policy. In addition to food, species offer many direct and indirect benefits to mankind. [68](http://www.truthnews.net/world/2004080046.htm?_m=15aac6482af89f930a3e32f7a8def8da&csvc=le&cform=byCitation&_fmtstr=FULL&docnum=1&_startdoc=1&wchp=dGLbVlW-zSkAA&_md5=37ae2564ed6a714dcd205b0ee5431e9a#n68) 2.Ecological Value. -- Ecological value is the value that species have in maintaining the environment. Pest, [69](http://www.nasa.gov/pdf/490945main_10-10_TFPD.pdf?_m=15aac6482af89f930a3e32f7a8def8da&csvc=le&cform=byCitation&_fmtstr=FULL&docnum=1&_startdoc=1&wchp=dGLbVlW-zSkAA&_md5=37ae2564ed6a714dcd205b0ee5431e9a#n69) erosion, and flood control are prime benefits certain species provide to man. Plants and animals also provide additional ecological services-- pollution control, [70](http://www.nasa.gov/pdf/432577main_Earth_Science_R1.pdf?_m=15aac6482af89f930a3e32f7a8def8da&csvc=le&cform=byCitation&_fmtstr=FULL&docnum=1&_startdoc=1&wchp=dGLbVlW-zSkAA&_md5=37ae2564ed6a714dcd205b0ee5431e9a#n70)oxygen production, sewage treatment, and biodegradation.[71](http://www.wired.com/science/discoveries/news/2003/05/58966?_m=15aac6482af89f930a3e32f7a8def8da&csvc=le&cform=byCitation&_fmtstr=FULL&docnum=1&_startdoc=1&wchp=dGLbVlW-zSkAA&_md5=37ae2564ed6a714dcd205b0ee5431e9a#n71) 3.Scientific and Utilitarian Value. -- Scientific value is the use of species for research into the physical processes of the world. [72](http://www.lexis.com/research/retrieve?_m=15aac6482af89f930a3e32f7a8def8da&csvc=le&cform=byCitation&_fmtstr=FULL&docnum=1&_startdoc=1&wchp=dGLbVlW-zSkAA&_md5=37ae2564ed6a714dcd205b0ee5431e9a" \l "n72" \t "_self) Without plants and animals, a large portion of basic scientific research would be impossible. Utilitarian value is the direct utility humans draw from plants and animals. [73](http://www.lexis.com/research/retrieve?_m=15aac6482af89f930a3e32f7a8def8da&csvc=le&cform=byCitation&_fmtstr=FULL&docnum=1&_startdoc=1&wchp=dGLbVlW-zSkAA&_md5=37ae2564ed6a714dcd205b0ee5431e9a" \l "n73" \t "_self) Only a fraction of the  [\*172]  earth's species have been examined, and mankind may someday desperately need the species that it is exterminating today. To accept that the snail darter, harelip sucker, or Dismal Swamp southeastern shrew [74](http://www.lexis.com/research/retrieve?_m=15aac6482af89f930a3e32f7a8def8da&csvc=le&cform=byCitation&_fmtstr=FULL&docnum=1&_startdoc=1&wchp=dGLbVlW-zSkAA&_md5=37ae2564ed6a714dcd205b0ee5431e9a" \l "n74" \t "_self) could save mankind may be difficult for some. Many, if not most, species are useless to man in a direct utilitarian sense. Nonetheless, they may be critical in an indirect role, because their extirpations could affect a directly useful species negatively. In a closely interconnected ecosystem, the loss of a species affects other species dependent on it. [75](http://www.lexis.com/research/retrieve?_m=15aac6482af89f930a3e32f7a8def8da&csvc=le&cform=byCitation&_fmtstr=FULL&docnum=1&_startdoc=1&wchp=dGLbVlW-zSkAA&_md5=37ae2564ed6a714dcd205b0ee5431e9a" \l "n75" \t "_self) Moreover, as the number of species decline, the effect of each new extinction on the remaining species increases dramatically. [76](http://www.lexis.com/research/retrieve?_m=15aac6482af89f930a3e32f7a8def8da&csvc=le&cform=byCitation&_fmtstr=FULL&docnum=1&_startdoc=1&wchp=dGLbVlW-zSkAA&_md5=37ae2564ed6a714dcd205b0ee5431e9a" \l "n76" \t "_self) 4.Biological Diversity. -- The main premise of species preservation is that diversity is better than simplicity. [77](http://www.lexis.com/research/retrieve?_m=15aac6482af89f930a3e32f7a8def8da&csvc=le&cform=byCitation&_fmtstr=FULL&docnum=1&_startdoc=1&wchp=dGLbVlW-zSkAA&_md5=37ae2564ed6a714dcd205b0ee5431e9a" \l "n77" \t "_self)As the current mass extinction has progressed, the world's biological diversity generally has decreased. This trend occurs within ecosystems by reducing the number of species, and within species by reducing the number of individuals. Both trends carry serious future implications. [78](http://www.lexis.com/research/retrieve?_m=15aac6482af89f930a3e32f7a8def8da&csvc=le&cform=byCitation&_fmtstr=FULL&docnum=1&_startdoc=1&wchp=dGLbVlW-zSkAA&_md5=37ae2564ed6a714dcd205b0ee5431e9a" \l "n78" \t "_self) [\*173]  Biologically diverse ecosystems are characterized by a large number of specialist species, filling narrow ecological niches. These ecosystems inherently are more stable than less diverse systems. "The more complex the ecosystem, the more successfully it can resist a stress. . . . [l]ike a net, in which each knot is connected to others by several strands, such a fabric can resist collapse better than a simple, unbranched circle of threads -- which if cut anywhere breaks down as a whole." [79](http://www.lexis.com/research/retrieve?_m=15aac6482af89f930a3e32f7a8def8da&csvc=le&cform=byCitation&_fmtstr=FULL&docnum=1&_startdoc=1&wchp=dGLbVlW-zSkAA&_md5=37ae2564ed6a714dcd205b0ee5431e9a#n79) By causing widespread extinctions, humans have artificially simplified many ecosystems. As biologic simplicity increases, so does the risk of ecosystem failure. The spreading Sahara Desert in Africa, and the dustbowl conditions of the 1930s in the United States are relatively mild examples of what might be expected if this trend continues. Theoretically, each new animal or plant extinction, with all its dimly perceived and intertwined affects, could cause total ecosystem collapse and human extinction. Each new extinction increases the risk of disaster. Like a mechanic removing, one by one, the rivets from an aircraft's wings, n80 mankind may be edging closer to the abyss.

#### We should feel an ethical obligation to protect wildlife

**Dickins 14,** BSc Environmental Science, “Should we allow species to go extinct?” http://www.conservation-jobs.co.uk/60348/allow-species-go-extinct/

The planet is currently in its sixth extinction period, and if species – area theory is to believed we could be losing 140,000 species a year at the moment. It comes at no surprise then that a new paper published in Biological Conservation looks at the past attitudes of conservationists towards species extinctions. In ‘Species extinction is a great moral wrong‘ Philip Cafaro suggests we have a moral obligation to protect species. Most extinctions in the past have been due to natural causes, but now we live on a planet which is increasingly shaped by the actions of man. In fact some call the current epoch we live in the Anthropocene because man is having such a big influence on the environment. Cafaro talks about one paper where the authors believe species extinction isn’t morally wrong. In ‘What is Conservation Science?’ Karieva and Marvier suggest that we need to be more realistic when the presence of animals becomes incompatible with economic development. For example, they say extinctions should be nothing to worry about as long as they don’t affect us. However, are we really immune from the impacts of species extinctions? Species which prey on or parasitise the species in question will certainly be impacted. Many animals and plants have value to us, providing food and helping draw in tourists to countries. We couldn’t imagine a world where there weren’t any cattle, so why should we let less valued species go extinct. In fact even some highly valued species, such as rhino and elephant, are slipping towards extinction because we are failing to protect them. Cafaro goes on to explain that humans benefit from many ecosystem services, such as food, fresh water, climate regulation and recreation. Therefore if ecosystems collapse due to the loss of a species we will certainly feel the effects. For example, elephants are a keystone species and their continued loss to poaching could change the entire functioning and look of the African ecosystems they reside in. Would we still visit Africa for safaris if the landscape looked completely different? In addition we should think about the destruction of the Amazon rainforest. It is believed there are still many species to be discovered in the Amazon, yet the rainforest continues to be destroyed. Trees help to regulate the planet’s climate and their destruction can only aid the current climate change we are seeing today. Some ecosystems are more likely to be resilient to change than others, but if we let extinctions happen we should proceed with caution because we may not know where the tipping point is. We need to think about if we have the right to just let species become extinct, especially in an age where we are the main cause of most extinctions. In conclusion, the paper by Cafaro finds there are mixed opinions about species extinctions in the scientific community. Human population growth certainly poses a threat to species the world over. It is going to be a challenge to reduce the number of species extinctions, especially those caused by humans. There is definitely room for us to protect species and their ecosystems as well as continue our economic development.

### They Say: “Oceans are resilient”

#### Resiliency is flawed- fails to take into account multiple presures

Hughes et al 05 (Terrence P. Hughes and David R. Bellwood Centre for Coral Reef Biodiversity, School of Marine Biology & Aquaculture, James Cook University, Australia AND Carl Folke Department of Systems Ecology, Stockholm University, and Beijer International Institute of Ecological Economics, Royal Swedish Academy of Sciences, Stockholm, Sweden AND Robert S. Steneck School of Marine Sciences, University of Maine, Darling Marine Center, AND James Wilson School of Marine Sciences, University of Maine, “New paradigms for supporting the resilience of marine ecosystems” TRENDS in Ecology and Evolution Vol.20 No.7 July 2005 <http://eaton.math.rpi.edu/csums/papers/Ecostability/hughesparadigms.pdf>) //BLOV

The importance of scale Developing marine policy and managing natural resources requires multi-scale ecological and social infor- mation. Traditionally, most ecological studies are brief and localized. However, the need for advice on how to cope with the impacts of environmental degradation, climate change and widespread overfishing is a major driver of an accelerating trend for the scaling-up of marine ecological studies. For example, the history of ecosystems (i.e. how they got to be in their current condition) is an important aspect of temporal scale that has far-reaching conse- quences for research and resource management [1,8,46–49] . If we ignore history and are unaware of trajectories of change, then a system is more likely to be falsely perceived as being stable and pristine [40] . In recent years, ecologists have focused increasingly on the cumulative and interactive effects of sequences of events, rather than concentrating solely on the most recent insult that leads to ecosystem collapse [1,15,16,20] . Nonetheless, most researchers still view resilience in terms of recovery from the most recent single disturbances, such as a storm or hurricane, to a single equilibrium. By contrast, social– ecological resilience focuses on absorbing recurrent per- turbations, and on coping with uncertainty and risk, recognizing that disturbance and change are an integral component of complex SESs [21,22,50] . Consequently, the timeframe for understanding and managing SES resi- lience is often much longer than the conventional one– three years of most ecological studies. For example, it is sobering to consider that, in the timeframe required for comprehensive regeneration of fish stocks in coral reef NTAs ( O 20 years), the human population size of develop- ing countries is likely to double [51] .

#### Species Snowball- small degradations push us closer to threshold of collapse

Hughes et al 05 (Terrence P. Hughes and David R. Bellwood Centre for Coral Reef Biodiversity, School of Marine Biology & Aquaculture, James Cook University, Australia AND Carl Folke Department of Systems Ecology, Stockholm University, and Beijer International Institute of Ecological Economics, Royal Swedish Academy of Sciences, Stockholm, Sweden AND Robert S. Steneck School of Marine Sciences, University of Maine, Darling Marine Center, AND James Wilson School of Marine Sciences, University of Maine, “New paradigms for supporting the resilience of marine ecosystems” TRENDS in Ecology and Evolution Vol.20 No.7 July 2005 <http://eaton.math.rpi.edu/csums/papers/Ecostability/hughesparadigms.pdf>) //BLOV

The spatial scale of dispersal of larvae, pollutants and exotic species is crucial for our understanding of the dynamics of marine systems and for sustaining SES resilience ( Figure 2 ). Traditionally, marine ecologists have assumed that local populations are open and that the production and supply of larvae, although often highly variable, is effectively inexhaustible. A corollary of this expectation is that damaged ecosystems will recover to equilibrium conditions given sufficient time ( Box 1 ). However, larval dispersal is surprisingly limited for many coastal species [55] and, consequently, the local loss of reproductive adults (e.g. through overfishing, disease or climate change) can disrupt stock–recruitment relationships [56] . Self-seeding populations on remote islands or reefs are particularly vulnerable [57] . Con- versely, species with long-distance dispersal should be more resistant to habitat fragmentation, leading to a filtering effect that selectively impacts on species with limited dispersal abilities ( Figure 2 ). Even where local populations are highly interconnected by multiple sources of larvae, if too many patches of habitat degrade, the remaining healthy ones can cata- strophically collapse, once a critical threshold is passed [58] . From a complex-systems perspective, the small- scale degradation of each patch represents a phase shift (e.g. when algae replace corals on a single reef). Further- more, the dynamics of individual patches can propagate through larval dispersal to much larger scales, potentially leading to a phase shift of the entire system [41,58,59] .We speculate that a system-wide collapse is currently unfold- ing in the Caribbean, where the last few relatively intact coral reefs are increasingly vulnerable to degradation [3,7,60] . Importantly, because system-wide collapse is an emergent property of small-scale dynamics, even the most rigorous management of remnant areas could be too little, too late. The important lesson for conservation is that multi-scale dynamics requires multi-scale management, not just small-scale meddling

## Exploration DA – 1NC

### 1NC – NOPP

#### Current ocean research is limited by consensus but increased volume wrecks ecosystems – it’s on the brink

Warner 08 (Robin M., University of Wollongong, “Protecting the diversity of the depths: environmental regulation of bioprospecting and marine scientific research beyond national jurisdiction”, Ocean Yearbook 22, http://ro.uow.edu.au/cgi/viewcontent.cgi?article=1178&context=lawpapers)

The remote nature and extreme conditions of deep seabed environments impose automatic limitations on the numbers of scientific expeditions which can reach areas deeper than1000 metres below the surface of the ocean." Nevertheless there are now a wide array of independent public and private research institutions engaged in deep seabed research with definite physical impacts on the marine environment." Several commentators note that deep sea science has now moved from a descriptive and observational phase to a more interventionist stage which involves sampling and the installation of scientific equipment on the deep sea floor to conduct in situ experiments." A 2005 United Nations University/Institute of Advanced Studies report on Bioprospecting of Genetic Resources on the Deep Seabed describes the second American Museum of Natural History black smokers expedition to the Endeavour segment of the Juan de Fuca mid ocean ridge which removed four chimneys of several tons each from this hydrothermal vent area at a depth of 2,300 metres." Other reported impacts include the removal of benthic fauna and the introduction of alien elements such as light and noise into the deep sea environment." Some deep sea experiments have resulted in changes of water temperature and the disposal of biological material in areas different from the sampling area. Scientists are also concerned about the rising frequency of visits to hydrothermal vents and the pressure caused by concentrated observation and sampling on a few well known vent communities which have been subjected to multiple research expeditions." The absence of restrictions on access to the deep seabed has led to different research institutions proposing duplicate and incompatible scientific experiments for the same deep seabed area." While the deep sea scientists themselves have begun to impose some constraints on their research expeditions through a research reserve system which operates by consensus between scientists, amplified research of deep seabed sites in the future may require a more systematic approach where access to certain sites is controlled to reduce adverse impacts on the marine environment."

#### More specifically, increased exploration will lead to mining and fishing that destroy the environment before we know what we’re doing to it

Levitt 10 (Tom, “How deep-sea mining could destroy the 'cradle of life on earth'”, Ecologist, 10/28/10, www.theecologist.org/News/news\_analysis/653840/how\_deepsea\_mining\_could\_destroy\_the\_cradle\_of\_life\_on\_earth.html)

I don’t think the project would be allowed to proceed anywhere else in the world based on such a poor analysis of risks,’ says Steiner. The USA is known to have similar deposits off the coast of Washington as has Canada but mining is not thought to be imminent. Dr Fujita suggests Nautilus is just the latest overseas mining giant to take advantage of lax regulations in the country. ‘In PNG they have a poor record of mining on land resulting in lots of poor conditions and that bad record and lack of oversight is now moving from land to sea,’ he says.   Only this week the PNG government was accused by Greenpeace of allowing rampant logging and failing to respect the rights of indigenous groups who depend on the forests. Nautilus has reportedly suggested the country would benefit by more than $200 million from the mining but Steiner says the benefits to local people or the economy of PNG were likely to be disproportionately low compared to the scale and risk of the project. ‘While the project could gross almost $1 billion USD in its 30-month lifetime, it expects to provide only $41 million in total taxes and royalties to the government, a $1.5 million development fund and a few dozen jobs at most to PNG nationals,’ he said. Prof Steiner is also acting as a science advisor to Mas Kagin, a group formed in 2008 to give a voice to coastal indigenous people in PNG oppose any commercial mining. The group says it depends on the coastal waters for their ‘livelihood, culture and way of life’ and has a right to oppose the seabed mining. In a [campaign video community groups](http://www.youtube.com/watch?v=nK3ln2E9ZlU&feature=channel)from two provinces expressed their fears.   ‘When we first heard that Nautilus was going to mine the seabed using technology that had never been used anywhere else it felt as though we were becoming a science lab…and our very lives part of an experiment to test this new technology,’ it says. Nautilus conducted workshops with local villages to explain its proposals but rejected calls to set up a permanent citizens advisory council. The company also declined to respond to concerns raised in this article but has previously said it took great pride in ‘leading the mining industry into the deep ocean’.    Opening the floodgates It has estimated several billions tons of copper could be extracted from seafloor sites around the world. Dr Tyler acknowledges that the deep-sea has ‘not even had its surface scratched with what it might contribute to the economy’ but fears PNG’s decision to approve Nautilus mining plans will ‘open the floodgates’ before proper assessments have been made of the impact. China is known to be seeking to mine similar deposits in the South-West Indian Ocean. ‘Deep-sea fishing is a good example. We can ring alarm bells but there is no regulation of it. If I had my way the whole area of deep-sea would become a protected area and people who want to exploit it would have to apply to a body who can ensure that they were doing a proper environmental analysis before they were allowed to exploit it. At the moment there is no requirement at all and we end up looking at the damage done,’ he says. Steiner agrees and says there is too much wrong with the PNG project: ‘the way this first deep-sea mine proceeds will set the tone for all others, and this is a very, very bad start’. He argues investment in reusing copper and gold made more sense than continuing to pay mining companies to take bigger risks in an effort to dig up more. ‘The global economy simply does not need the gold or copper that would be recovered at these deep-sea hydrothermal vents. We know how to recycle and reuse much of the copper already up out of the ground, run through the economy, and discarded in waste dumps. It is a unidirectional waste of resources, energy and money. And we know better.’

#### That turns the aff – the increased exploration will cause irreparable damage to the environment

Ruth 06 (Laura, “Gambling in the deep sea”, EMBO Reports 7:1, January 2006, http://www.ncbi.nlm.nih.gov/pmc/articles/PMC1369241/)

The problem is further hampered by the fact that the open seas—and most of the world's seabed ecosystems—lie in international waters beyond national laws and unregulated by international laws. According to Salvatore Arico of the United Nations Educational, Scientific and Cultural Organization (UNESCO; Paris, France), the UN began to address this problem in 1995 and started to debate international regulations, realizing that the extreme environments of the deep sea would be of academic and commercial interest, similar to the Yellowstone's geysers. Arico commented that the debate then stalled for years owing to a lack of support by some nations that actively conduct deep-sea research, most notably the USA and Japan. Eventually, in 2004, Sam Johnston, a member of the UN University Institute for Advanced Studies (UNU–IAS; Yokohama, Japan), commissioned the deep-sea genetic resources report to catalyse further policy development ([Arico & Salpin, 2005](http://www.ncbi.nlm.nih.gov/pmc/articles/PMC1369241/#b1)). …the open seas—and most of the world's seabed ecosystems—lie in international waters beyond national laws and unregulated by international laws The report, a joint effort between Arico and Charlotte Salpin, a law and policy expert associated with UNU–IAS, makes several key recommendations. First, it emphasizes the need for further study of the “whole world down there—knowing how these ecosystems function is important for the planet”, according to Arico. Second, any international regulation should take into account that some deep-sea ecosystems are already threatened by unsustainable use. “While it is impossible to quantify the damage caused by such research on the deep seabed environment, threats include destruction of habitats, unsustainable collection, alteration of local hydrological and environmental conditions, and pollution of various nature,” the report states. “The same activities can have very different impacts in various deep sea ecosystems, and cumulative impacts over time…” Third, it should address the problem that at present, scientific research in international waters is unregulated. Johnston added that bioprospecting, to be distinguished from pure academic research, has already begun. The absence of international regulations has therefore created negative effects for academic research, most notably secretive scientific protocols, which force each expedition to start de novo. He also highlighted the difficulty that governments face when creating regulations for benefit sharing.

## Exploration DA – 2NC/1NR

### They Say “Not Unregulated”

#### Deep-ocean exploration leads to dangerous commercial exploitation that isn’t regulated – profit motive overcomes environmental considerations

Ruth 06 (Laura, “Gambling in the deep sea”, EMBO Reports 7:1, January 2006, http://www.ncbi.nlm.nih.gov/pmc/articles/PMC1369241/)

For decades, the depths of the oceans have fascinated researchers. The discovery of strange creatures perfectly adapted to eternal darkness, high pressure, and other unusual conditions has raised enormous interest in how life emerged on Earth and how it flourishes in such extreme environments ([Fig 1](http://www.ncbi.nlm.nih.gov/pmc/articles/PMC1369241/figure/f1/)). This abundance of life has also lured researchers and biotech companies to the oceans in the hope of finding unknown genes, proteins, and other compounds that could be exploited commercially. Despite the enormous costs that still pose a considerable barrier to deep-sea research and exploitation, some now worry about the negative side effects of deep-sea bioprospecting. Scientists, entrepreneurs, politicians and legal experts have begun to debate problematic issues, such as the preservation of deep-sea biodiversity, habitat protection and sharing of benefits. Their aim is to draft international regulations to prevent environmental and scientific tragedies without hampering discovery. Scientists have made—and continue to make—exciting discoveries in the depths of the oceans. In the early 1980s, Karl Stetter, a microbiologist from the University of Regensburg, Germany, discovered a hyperthermophilic archaebacterium that flourishes near submarine vents ([Fig 2](http://www.ncbi.nlm.nih.gov/pmc/articles/PMC1369241/figure/f2/)) at temperatures of about 100 °C ([Stetter, 1982](http://www.ncbi.nlm.nih.gov/pmc/articles/PMC1369241/#b6)). Stetter and his colleagues described another archaebacterium in 2002, termedNanoarchaeum equitans. This organism is parasitic with an unusually small ribosomal RNA and now represents a new phylum in the bacterial world ([Waters et al, 2003](http://www.ncbi.nlm.nih.gov/pmc/articles/PMC1369241/#b9); [Huber et al, 2002](http://www.ncbi.nlm.nih.gov/pmc/articles/PMC1369241/#b4)). he first six months of 2005 saw the publication of the discovery of a jellyfish that uses red fluorescent flashes to lure fish ([Haddock et al, 2005](http://www.ncbi.nlm.nih.gov/pmc/articles/PMC1369241/#b3)) and the genome sequence of Photobacterium profundumstrain SS9 ([Vezzi et al, 2005](http://www.ncbi.nlm.nih.gov/pmc/articles/PMC1369241/#b8)), 20 years after the microorganism was isolated from an amphipod animal living 2,500 m deep in the Philippine Sulu Sea ([Yayanos, 1995](http://www.ncbi.nlm.nih.gov/pmc/articles/PMC1369241/#b10)). Tim Shank, a biologist at Woods Hole Oceanographic Institution (WHOI; Woods Hole, MA, USA), is studying a worm that lives at 80 °C in an oily tar-like pit near submarine vents. The organism lives in the presence of carcinogenic amounts of polyaromatic hydrocarbons, but does not develop cancer. According to Shank, studying the DNA-repair mechanisms of the organism may lead to new insights about cancer growth and even possible treatments. Shank's research is just one example of the potential commercial possibilities emerging from the genetic wealth in the deep sea, sometimes coined ‘blue gold'. Until now, only a few products have made it from research to market. Diversa (San Diego, CA, USA) and New England Biolabs (NEB; Ipswich, MA, USA) sell DNA polymerases isolated from deep-sea vents that offer advantages such as increased thermostability and improved proofreading capabilities for the polymerase chain reaction. Sederma (Le Perray en Yvelines, France) sells Venuceane™, a skin protection product that includes a radical-scavenging enzyme originally discovered in extremophile bacteria from the Gulf of California ([Lintner et al, 2002](http://www.ncbi.nlm.nih.gov/pmc/articles/PMC1369241/#b5)). However, the global sales of marine biotechnology products in 2002, including anti-cancer compounds, antibiotics and antivirals, were estimated at about US$2.4 billion ([BCC, 2003](http://www.ncbi.nlm.nih.gov/pmc/articles/PMC1369241/#b2)). Such a healthy market for products encourages companies and academics to explore the oceans further for interesting organisms. Diversa, which produces enzymes, proteins and biologically active compounds for pharmaceutical, agricultural and industrial use, maintains an active deep-sea research programme, although it is not the focus of their research, according to Leif Christoffersen, Biodiversity Product Manager at Diversa. … a healthy market for products encourages companies and academics to explore the oceans further for interesting organisms However, the lines between academia and industry are becoming increasingly blurred. Stetter, one of the world's leading experts on extremophilic archaebacteria, is a co-founder of Diversa. Craig Venter, founder of Celera Genomics, launched the Sorcerer II Expedition in Nova Scotia, Canada, in 2003, to create a genomic catalogue of marine microorganisms. The expedition, now situated off the east coast of Australia, has already shown insights into the diversity and abundance of organisms in samples from the Sargasso Sea near Bermuda ([Venter et al, 2004](http://www.ncbi.nlm.nih.gov/pmc/articles/PMC1369241/#b7)). Melanie Wranaker, media contact at the J. Craig Venter Institute (Rockville, MD, USA), said that the research includes the study of extreme environment sites, such as hydrothermal warm seeps, hypersaline lagoons and low-oxygen environments, which may be similar to deep-sea environments and therefore useful for comparative studies. All data collected will be deposited into the public domain for researchers. The Ocean Genome Legacy (OGL) is another non-profit marine research organization that explores the abundance of life in the deep sea. Their headquarters are located in Ipswich, MA, USA, near NEB, from which the organization receives financial support. One reason why academic scientists and institutions team up with commercial partners is the high cost of deep-sea research. Few countries can afford dedicated academic deep-sea research programmes and equipment such as specialized ships and submarines (see [Fig 3](http://www.ncbi.nlm.nih.gov/pmc/articles/PMC1369241/figure/f3/)): namely the USA and Japan, although France, the UK and Russia also have deep-sea research capabilities. A 30-day expedition cruise costs roughly US$1 million, with an average daily operating cost of about US$30,000. Diversa, which collaborates with Deep Ocean Expeditions, estimate its annual costs to be approximately US$5–6.5 million to operate the RV Akademik Keldysh ship, owned and operated by the PP Shirshov Institute of Oceanology in Moscow, Russia. These high costs usually require academic and commercial partnerships—academic institutions have the equipment and the knowledge, and the commercial partners provide funds and other useful capabilities. Justin Manley, Lead Ocean Engineer at Mitretek Systems, a non-profit scientific research and engineering corporation (Falls Church, VA, USA), explained that alliances between the biotechnology and pharmaceutical sector with other industries, such as the oil and shipwreck salvaging businesses, might become fruitful avenues in the future. “One million dollars is a drop in the bucket compared to what oil companies spend on oil rigs,” he commented. Shank also thinks that as soon as more benefits from deep-sea research materialize, such as new chemicals, proteins and enzymes with new properties, other industries will get into the game. Although the funding is welcome, Shank noted, “We are wary of companies taking the samples and not communicating results…As a result, some academics do not provide samples to industry.” Past experience shows that this concern is valid. Although researchers discovered the Thermus aquaticus microorganism in Yellowstone National Park in 1967, the park does not benefit in any way from sales of the heat-stable Taq polymerase for polymerase chain reactions. This situation changed with the passage of the Convention on Biological Diversity (CBD) in 1992, which allows governments and organizations to negotiate contracts with scientists when they give them access to national land and water resources. According to Eric Mathur, Vice President of Scientific Affairs and Molecular Diversity at Diversa, before the passage of the CBD, academics had the freedom to patent discoveries and transfer samples to interested industrial partners. The contract between the discoverers of P. profundum and the Philippine government, which prohibits any financial gains from discoveries in the Sulu Sea, is an example of how things have changed. Still, fears remain: environmental groups sued Yellowstone National Park in August 1997 for making the first biodiversity agreement in the USA to share scientific and monetary benefits with Diversa. In a historic decision, a federal court in Washington, DC, approved this agreement between Yellowstone National Park and Diversa on April 12, 2000. In addition, the US National Park Service began conducting environmental analyses to evaluate the impacts of bioprospecting benefit-sharing agreements in US national parks. This review may represent the first nationwide study of the environmental impacts of bioprospecting benefit-sharing activities ever undertaken by any country. Critics also fear that industrial exploitation may create environmental problems similar to overfishing and mining of marine areas. According to Shank, the establishment of thermal-vent marine preserves off the coasts of Oregon and Portugal in the past two years was in part a response to such concerns. However, Barbara Moore, Director of the US National Oceanic and Atmospheric Administration's Undersea Research Program (NOAA; Silver Spring, MD, USA), is less pessimistic about the environmental impact of deep-sea research. She pointed out that the combination of small samples of microorganisms, non-specific sampling techniques and high costs make deep-sea bioprospecting less of a threat to the environment. She added that sea-floor tectonics and ‘plumbing' of the vents continually change the environments and their living communities. Moore also stressed that other deep-sea ecosystems, such as cold seeps, methane hydrate seeps and deep-sea corals, also known as cold-water corals, are as important to the overall ecosystem as the deep-sea vents.

### They Say: “Status Quo Solves Mining Harms”

#### Deep sea mining is not safe – current governments are withdrawing now

Samson 12 [Mellie, conservation biologist at the Institute of Biological Research in Papua New Guinea., December 7, http://www.scidev.net/global/biodiversity/opinion/deep-sea-mining-a-dangerous-experiment.html]

Deep sea mining (DSM) is the new frontier in extractive mining. For the companies involved, as well as the governments that own the mining rights, it offers substantial profits. However DSM is still experimental in nature, with potentially vast adverse environmental effects. It also makes use of [new technologies](http://www.scidev.net/en/new-technologies/) that have yet to be tested. In January 2011, the government of Papua New Guinea (PNG) granted the world's first deep-sea mining lease to Nautilus Minerals Inc, a Canadian mining firm, which is about to embark on a seabed mining project known as the Solwara 1 project. This experiment, in which the PNG government will have a substantial stake, will take place 1.6 kilometres below the surface of the Bismarck Sea, off the coast of the New Ireland Province of PNG. In recent months, however, the government has come under increasing pressure from environmental groups and others to withdraw from the project, on the basis that not enough is yet known about its potential environmental impact. Whatever decision is taken, other island nations should reflect on the arguments being made about the dangers of moving too hastily into DSM, and consider their responsibility to protect marine biodiversity and the seas within the Pacific region.

### They Say “NOPP Improves Ocean”

#### Deep-sea research has been limited so far – aff opens it up to commercial exploitation

Leary 04 (David K., “Bioprospecting and the Genetic Resources of Hydrothermal Vents on the High Seas: What is the Existing Legal Position, Where are we Heading and What are our Options?”, Macquarie Journal of International and Comparative Environmental Law 7, 2004, http://www.austlii.edu.au/au/journals/MqJlICEnvLaw/2004/7.html#Heading58)

So far sample collection from hydrothermal vents is exclusively conducted by scientific research institutions. There are numerous national research institutions involved in research in relation to hydrothermal vents. These include the Japan Agency for Marine Earth Science and Technology (formerly the Japan Marine Science and Technology Centre) (JAMSTEC), Australia’s Commonwealth Scientific Industrial and Research Organisation (CSIRO), Institut français de recherche (IFREMER), the Korean Ocean Research and Development Institute (KORDI), the Woods Hole Oceanographic Institute, and the New Zealand Institute of Geological and Nuclear Sciences, to name but a few. Commercial interests gain access to samples collected through research collaboration with such institutions, or through national culture collections where samples are deposited by research institutions.[[52]](http://www.austlii.edu.au/au/journals/MqJlICEnvLaw/2004/7.html" \l "fn53) There are a number of examples of scientific research institutions, Universities, and National Culture Collections that are involved in collaborative research with industry. For example, the Frontier Research program for extremophiles at JAMSTEC collaborates with industry on the development of biotechnology from extremophiles collected by JAMSTEC through its Bioventure Centre. There is no substantiated evidence that any company has mounted their own dive (as distinct from those in collaboration with scientific research institutions) to hydrothermal vents for sample collection purposes. There is anecdotal evidence, though, that at least one company is planning its own series of dives, independent from any research institution. It is not known precisely what the purposes of these dives are or indeed whether such dives have taken place.[[53]](http://www.austlii.edu.au/au/journals/MqJlICEnvLaw/2004/7.html" \l "fn54)

#### The affs research programs kills ocean ecosystems – foreign species, light and noise pollution

Warner 08 (Robin M., University of Wollongong, “Protecting the diversity of the depths: environmental regulation of bioprospecting and marine scientific research beyond national jurisdiction”, Ocean Yearbook 22, http://ro.uow.edu.au/cgi/viewcontent.cgi?article=1178&context=lawpapers)

Bioprospecting, while not as invasive as deep seabed mineral exploration, does entail physical disturbance, alteration and introduction of alien elements to deep sea habitats." Current deep sea research projects, principally on hydrothermal vent sites, have progressed beyond simple observation of the benthic fauna from manned or remotely controlled submersible vessels to actual sampling of the fauna and faunal infrastructure and installation of scientific instruments in the deep seabed environment to record experimental observations on a regular basis. As well as disturbing the physical habitat, research vessels and scientific equipment also introduce light and different noise pattems into the fragile deep sea environment and may discharge marine pollutants and alien biological material into the previously pristine environment of the deep seabed. The negative impact of frequent research expeditions on particular deep seabed sites and the potential for conflicting or incompatible research activities which duplicate adverse effects on fragile deep sea sites has also been noted by scientists and other commentators. The absence of compulsory environmental protection measures such as environmental baseline data collection, ongoing environmental impact assessment of sampling sites and impact reference zones could result in substantial loss of deep seabed biodiversity over time. Scientists involved in deep sea research have developed some voluntary protocols to reduce the negative impacts of their research on the deep seabed environment including requests to the global scientific community to consider certain deep seabed sites as scientific reserves and voluntary codes of conduct which seek to minimise adverse effects on the environment and to coordinate deep seabed research to reduce the occurrence of simultaneous expeditions to deep seabed sites and conflicting use of these sites." As bioprospecting activities are currently intermingled with marine scientific research, these initiatives have the dual purpose of reducing the adverse effects of botl1 bioprospecting and marine scientific research activities on the deep sea environment.

#### Unregulated research leads to widespread exploitation – kills ecosystems and turns the case

Warner 08 (Robin M., University of Wollongong, “Protecting the diversity of the depths: environmental regulation of bioprospecting and marine scientific research beyond national jurisdiction”, Ocean Yearbook 22, http://ro.uow.edu.au/cgi/viewcontent.cgi?article=1178&context=lawpapers)

A fourth option to consider is leaving the open access situation which currently applies to the genetic and biochemical resources of the deep seabed and to bioprospecting activities in these areas undisturbed. This option would parallel the free market conditions which applied to all high seas fisheries before the advent of the UN Fish Stocks Agreement and regional fisheries management organization involvement in the management and conservation of straddling stocks and highly migratory stocks in marine areas beyond national jurisdiction. As one commentator has observed, this may lead to some long term advantages for human kind in general as the competition engendered competitive exploitation of genetic and biochemical resources found on the deep seabed will stimulate new inventions and research techniques." On the other hand commercial investors will have little incentive to introduce costly measures for the conservation and sustainable use of genetic and biochemical resources and the protection of deep seabed biodiversity. Marine scientists and other commentators have predicted that the failure to implement environmental protection measures for deep seabed environments such as hydrothermal vents, cold seeps and seamounts risks rapid loss of species and general degradation of fragile habitats." ln addition, the primary motive for commercial invesmtent will be the maximisation of profits rather than any commitment to the fair and equitable benelit sharing of global commons resources for current and future generations. While bioprospecting activities continue to be predominantly conducted by state sponsored research institutions with the dual purpose of marine scientific research, voluntary codes of conduct introduced by deep sea scientists will afford some level of protection for the surrounding marine environment. The next section will examine the content of one of these codes. These measures are voluntary, however, and will not bind commercial operators who conduct bioprospecting activities in a private enterprise framework. Ultimately failure to address the regulation of bioprospecting activities could lead to rapid over exploitation of these valuable resources of the deep seabed and the loss of important genetic and biochemical material not yet discovered by marine scientists.

# Affirmative

## Invasive Species DA – 2AC

### 2AC – Oceans Declining

#### Biodiversity and oceans are declining for three reasons

#### Whaling

COLLINS 14 (Katie, writer for Wired Science, Whales are the engineers of our ocean ecosystems, <http://www.wired.co.uk/news/archive/2014-07/03/whales-ecosystem-engineers>, 7/3/14)

Thanks to marine biologists around the world we now know that the gentle giants of our oceans have a powerful and positive impact on our underwater ecosystems. It has long been presumed that whales are so rare that their effect on our oceans is negligible. Not so, according to new research published in the journal Frontiers in Ecology and the Environment, which has taken into account several decades of whale-related data and found that their influence can be seen in the global carbon storage and the health of commercial fisheries. In the past fishermen have often taken taken the view that whales, which after all have massive metabolic demands, are their competition. It turns out, however, that a prevalence of whales actually encourages the development of more robust fisheries. It's estimated that the dramatic decline in whale numbers, primarily due to industrial whaling, has seen their numbers decline between 66 and 90 percent, but there are signs of recovery, which could well have a dramatically positive impact on the health of ocean ecosystems overall. "Future changes in the structure and function of the world's oceans can be expected with the restoration of great whale population," write the researchers in the study's abstract.

#### Declining fish size

Rietta 14 (commentator at Pucci Foods ocean blog citing a recent study, conducted by fisheries scientists with the University of Aberdeen, Rising Ocean Temperatures: Smaller Fish Will Impact Fisheries and Ecosystems Unless Humans Learn to Adapt, <http://puccifoods.com/pucciseafood-new/blog/ocean-temperatures-rise-smaller-fish-will-impact-fisheries-ecosystems-unless-humans-learn-adapt/>, 3/3/14)

There may be serious negative effects on entire ecosystems that come with decreasing fish size. Everything in the ocean food web is connected – if fish on a lower trophic level become smaller, they will naturally yield fewer nutrients for organisms higher up on the energy chain. These animals could be predatory fish or sharks that are already suffering from the same depleted oxygen levels, or marine mammals that need to sustain massive amounts of energy to survive. They will be compelled to eat more of the smaller fish – lending to a decline in population – or switch their food source to something else. Ripple effects could be seen far and wide in many different ocean ecosystems. Organisms have an amazing ability to adapt and evolve to survive. But much more time is needed to keep things in balance. These fish are being forced to adapt too quickly to changing conditions – entire ecosystems need at least thousands of years to properly evolve. Right now human activity is forcing monumental changes over a span of decades.

#### Increased ocean temperatures

Rietta 14 (commentator at Pucci Foods ocean blog citing a recent study, conducted by fisheries scientists with the University of Aberdeen, Rising Ocean Temperatures: Smaller Fish Will Impact Fisheries and Ecosystems Unless Humans Learn to Adapt, <http://puccifoods.com/pucciseafood-new/blog/ocean-temperatures-rise-smaller-fish-will-impact-fisheries-ecosystems-unless-humans-learn-adapt/>, 3/3/14)

This study took place on fish data from the North Sea, but what about other areas? Although scientists predict that different regions will show quite a bit of variation, we have seen a global increase in sea surface temperatures. We must wonder how other animals are likely to be affected. If all our oceans are warming, then we must believe that they will all begin losing the capacity to hold oxygen. Organisms rely on this oxygen – it would be akin to our atmospheric being sucked away, so that humans were forced to survive on less oxygen. Imagine a world where it is hard for our lungs to gather enough oxygen to fuel the movement of our bodies. Just walking down the street would become a tremendously difficult task. Fish and invertebrates would surely lose the energy needed to find food, shelter and mates. Coral reefs are especially sensitive to environmental conditions, with higher temperatures causing coral bleaching and eventual death. Coral reefs are home to 25% of life in the oceans with biodiversity levels on par with terrestrial rainforests. Coral reefs provide millions of people with food and jobs in fishing and ecotourism. Their disappearance would have grave implications for the future.

### 2AC – Offshore Wind Improves Biodiversity

#### Link Turn-Dutch study demonstrates offshore wind has no negative impact on ecosystems --- actually improves biodiversity.

The Guardian, 8/11/2011. “Offshore wind farms are good for wildlife, say researchers,” <http://www.theguardian.com/environment/2011/aug/11/offshore-wind-farms-good-wildlife>.

#### It is the evidence proponents of offshore wind farms have been waiting for: [a Dutch study](http://iopscience.iop.org/1748-9326/6/3/035101) has found that offshore wind turbines have "hardly any negative effects" on [wildlife](http://www.theguardian.com/environment/wildlife), and may even benefit animals living beneath the waves. The researchers reached their conclusions after studying a wind farm near Windpark Egmond aan Zee, the first large-scale offshore wind farm built off the Dutch North Sea coast. Anti-wind farm campaigners have often argued that wind farms can have a negative impact on bird populations, while some critics have voiced concerns that offshore wind farms could prove disruptive to [marine life](http://www.theguardian.com/environment/marine-life). However, Professor Han Lindeboom from the [Institute for Marine Resources and Ecosystem Studies](http://www.imares.wur.nl/UK/) at Wageningen University and Research centre, said that the new study revealed little evidence of negative effects on local wildlife. "At most, a few bird species will avoid such a wind farm. It turns out that a wind farm also provides a new natural habitat for organisms living on the sea bed such as mussels, anemones and crabs, thereby contributing to increased biodiversity," he said. "For fish and marine mammals, it provides an oasis of calm in a relatively busy coastal area." The research, sponsored by NoordzeeWind, a joint venture of Nuon and Shell Wind [Energy](http://www.theguardian.com/environment/energy), claimed that offshore wind farms actually have a beneficial long-term effect on wildlife. The wind farm functions as a new type of habitat, the report said, detailing how new species are attracted to the turbine foundations and surrounding rocks. The researchers also noted that the turbines help to protect schools of cod, and that porpoises are heard more often inside than outside the wind farm. Meanwhile, the [survey](http://www.theguardian.com/environment/2011/aug/11/offshore-wind-farms-good-wildlife) concluded that sea bird species such as gannets tend to avoid the turbines, while seagulls appear unflustered and local cormorant [numbers](http://www.theguardian.com/environment/2011/aug/11/offshore-wind-farms-good-wildlife) even increase. "The number of birds that collided with the turbines was not determined but was estimated to be quite low on the basis of observations and [model](http://www.theguardian.com/environment/2011/aug/11/offshore-wind-farms-good-wildlife) calculations," the researchers added in the article, published in online journal [Environmental](http://www.theguardian.com/environment/2011/aug/11/offshore-wind-farms-good-wildlife) Research Letters. The study noted that the effects of wind farms will inevitably vary depending on their position, but that offshore wind farms can contribute to a more diverse habitat and even help nature to recover from the effects of intensive fishing, pollution, oil and gas extraction, and shipping.

### 2AC – Aquaculture Improves the Environment

#### Without action we will consume farmed fish from countries with less stringent regulations

Madin, 11 (9/21/2011, Kate, “Where Will We Get Our Seafood? Unlike the rest of the world, the U.S. has not embraced aquaculture,” <http://www.whoi.edu/oceanus/feature/where-will-we-get-our-seafood>, JMP)

By 2030 or 2040, most seafood bought by Americans will be raised on a farm, not caught by fishermen. And, unless policies governing aquaculture in the United States change, the vast majority of seafood eaten by Americans will be farm-raised in another country, possibly one with less stringent health and environmental regulations.

With wild fisheries in decline, the world has turned to aquaculture to provide protein to feed Earth’s rapidly growing human population. But not the United States. While aquaculture already produces half of the world’s seafood, U.S. aquaculture production has been declining since 2003 and today, the U.S. produces only 10 percent of its seafood by aquaculture, said Hauke Kite-Powell, an aquaculture policy specialist at Woods Hole Oceanographic Institution (WHOI). One consequence of this is that the U.S. imports 80 percent of the seafood it consumes, creating a seafood trade deficit.

### 2AC – Invasive Species Don’t Spread

#### Even if species invade the artificial reefs, they won’t necessarily spread to the rest of the native environment.

Jeffrey A. Crooks, May 2002. Smithsonian Environm. Res. Center and Romberg Tiburon Center, San Francisco State Univ. “Characterizing ecosystem-level consequences of biological invasions: the role of ecosystem engineers,” Oikos 97.2.

In this preliminary survey, we found 3 exotic species on oil platforms in California. Of these platforms, 2 (Holly, Houchin) are located re latively close to inshore natural rocky reefs and harbors (within 3 km). Either these exotic species have not been reported (Watersipora ?subtorquata, Diadllmene sp.), or they are present in extremely low abundance (Caprella mutiea) on natural rocky reefs. Their potential to invade natural habitats and to become important space holders in these habitats is unknown. Of the 3 species, C. mutiea may have the greatest potential to disperse in significant numbers to natural reefs. Although caprellid amphipods brood their young, juveniles and adults can become dislodged from the substratum and drift in the plankton (Smith 1977), often in association with drift macroalgae (Sano e t al. 2003). In contrast, dispersal of W. ?subtorquata may be very limited, since this species has a planktonic larval duration of hours and no mobility of juvenile and adult stages (Wisely 1958). This species recruited to settlement plates attached to Platform Gilda, but not to plates at the other 6 platforms, including the nearest platform, Grace (-6.4 km distant) (e. S. Culver unpubl. data). Similarly, small individuals of the anemone Diadumene sp. · were not observed on deployed settlement plates at platforms other than Platform Gail. These 2 species may depend more on mechanical transport via crewboats or barges for dispersal. In evaluating the potential of these exotic species to disperse to natural reefs, it is interesting to note that Wa tersipora ?subtorquata, Caprella mu tiea, and species of Diadumene have been reported from some embayments and harbors (Cohen et al. 2002). Their occurrence on offshore platforms, which are located in an oceanic climate, suggests that the abiotic conditions of embayments are not required for the successful invasion of these species, and that abiotic factors pe r se will not limit their spread to natural reefs. In addition to propagule supply (discussed above), biotic processes, including competition and predation, may play a role in limiting invasions into natural reefs. Coastal embayment and platform communities differ in species composition and abundance from those of nearshore rocky reefs and these differences may include the availability of potential competitors and predators that could influence the establishment of exotic species.

### 2AC – Alt Causes to Biodiversity Loss

**Multiple alternate causes to biodiversity loss- plan doesn’t overcome them**

Chivian 11, Director, Project on Global Environmental Change and Health; Physicians for Social Responsibility and AB, Harvard College; MD, Harvard Medical School, “Species Extinction, Biodiversity Loss and Human Health” http://www.ilo.org/oshenc/part-vii/environmental-health-hazards/item/505-species-extinction-biodiversity-loss-and-human-health

Human activity is causing the extinction of animal, plant and microbial species at rates that are a thousand times greater than those which would have occurred naturally (Wilson l992), approximating the largest extinctions in geological history. When homo sapiens evolved, some l00 thousand years ago, the number of species that existed was the largest ever to inhabit the Earth (Wilson l989). Current rates of species loss are reducing these levels to the lowest since the end of the Age of Dinosaurs, 65 million years ago, with estimates that one-fourth of all species will become extinct in the next 50 years (Ehrlich and Wilson l99l). In addition to the ethical issues involved - that we have no right to kill off countless other organisms, many of which came into being tens of millions of years prior to our arrival - this behaviour is ultimately self-destructive, upsetting the delicate ecological balance on which all life depends, including our own, and destroying the biological diversity that makes soils fertile, creates the air we breathe and provides food and other life-sustaining natural products, most of which remain to be discovered. The exponential growth in human population coupled with an even greater rise in the consumption of resources and in the production of wastes, are the main factors endangering the survival of other species. Global warming, acid rain, the depletion of stratospheric ozone and the discharge of toxic chemicals into the air, soil and fresh- and salt-water ecosystems - all these ultimately lead to a loss of biodiversity. But it is habitat destruction by human activities, particularly deforestation, that is the greatest destroyer

### 2AC – No Impact to Biodiversity

#### No impact to biodiversity

Sagoff 97  Mark, Senior Research Scholar – Institute for Philosophy and Public policy in School of Public Affairs – U. Maryland, William and Mary Law Review, “INSTITUTE OF BILL OF RIGHTS LAW SYMPOSIUM DEFINING TAKINGS: PRIVATE PROPERTY AND THE FUTURE OF GOVERNMENT REGULATION: MUDDLE OR MUDDLE THROUGH? TAKINGS JURISPRUDENCE MEETS THE ENDANGERED SPECIES ACT”, 38 Wm and Mary L. Rev. 825, March, L/N

Note – Colin Tudge - Research Fellow at the Centre for Philosophy at the London School of Economics. Frmr Zoological Society of London: Scientific Fellow and tons of other positions. PhD. Read zoology at Cambridge.

Simon Levin = Moffet Professor of Biology, Princeton. 2007 American Institute of Biological Sciences Distinguished Scientist Award 2008 Istituto Veneto di Scienze Lettere ed Arti 2009 Honorary Doctorate of Science, Michigan State University 2010 Eminent Ecologist Award, Ecological Society of America 2010 Margalef Prize in Ecology, etc… PhD

Although one may agree with ecologists such as Ehrlich and Raven that the earth stands on **the brink of** an episode of **massive extinction, it may not follow** from this grim fact **that human** being**s will suffer** as a result. On the contrary, skeptics such as science writer Colin Tudge have challenged biologists to explain **why we need more than a tenth of the 10 to 100 million species that grace the earth**. Noting that "cultivated systems often out-produce wild systems by 100-fold or more," Tudge declared that "the argument that humans need the variety of other species is, when you think about it, a theological one." n343 Tudge observed that "the elimination of all but a tiny minority **of our fellow creatures does not affect the material well-being of humans** one iota."n344 This skeptic challenged ecologists to list more than 10,000 species (other than unthreatened microbes) that are essential to ecosystem productivity or functioning. n345 "**The human species could survive just as well** if 99.9% of our fellow creatures went extinct, provided only that we retained the appropriate 0.1% that we need." n346   [\*906]   The monumental Global Biodiversity Assessment ("the Assessment") identified two positions with respect to redundancy of species. "At one extreme is the idea that each species is unique and important, such that its removal or loss will have demonstrable consequences to the functioning of the community or ecosystem." n347 The authors of the Assessment, a panel of eminent ecologists, endorsed this position, saying it is "unlikely that there is much, if any, ecological redundancy in communities over time scales of decades to centuries, the time period over which environmental policy should operate." n348 These eminent ecologists rejected the opposing view, "the notion that species overlap in function to a sufficient degree that removal or loss of a species will be compensated by others, with negligible overall consequences to the community or ecosystem." n349  Other biologists believe, however, that species are so fabulously redundant in the ecological functions they perform that the life-support systems and processes of the planet and ecological processes in general will function perfectly well with fewer of them, certainly fewer than the millions and millions we can expect to remain **even if** **every threatened organism becomes extinct**. n350 Even the kind of sparse and miserable world depicted in the movie Blade Runner could provide a "sustainable" context for the human economy as long as people forgot their aesthetic and moral commitment to the glory and beauty of the natural world. n351 The Assessment makes this point. "Although any ecosystem contains hundreds to thousands of species interacting among themselves and their physical environment, the emerging consensus is that the system is driven by a small number of . . . biotic variables on whose interactions the balance of species are, in a sense, carried along." n352   [\*907]   To make up your mind on the question of the functional redundancy of species, consider an endangered species of bird, plant, or insect and ask how the ecosystem would fare in its absence. The fact that the creature is endangered suggests an answer: it is already in limbo as far as ecosystem processes are concerned. What crucial ecological services does the black-capped vireo, for example, serve? Are any of the species threatened with extinction necessary to the provision of any ecosystem service on which humans depend? If so, which ones are they?  Ecosystems and the species that compose them have changed, dramatically, continually, and totally in virtually every part of the United States. There is little ecological similarity, for example, between New England today and the land where the Pilgrims died. n353 In view of the constant reconfiguration of the biota, **one may wonder why Americans have not suffered more as a result of ecological catastrophes**. The cast of species in nearly every environment changes constantly-local extinction is commonplace in nature-but the crops still grow. Somehow, it seems, property values keep going up on Martha's Vineyard in spite of the tragic disappearance of the heath hen.  One might argue that the sheer number and variety of creatures available to any ecosystem buffers that system against stress. Accordingly, we should be concerned if the "library" of creatures ready, willing, and able to colonize ecosystems gets too small. (Advances in genetic engineering may well permit us to write a large number of additions to that "library.") In the United States as in many other parts of the world, however, the number of species has been increasing dramatically, not decreasing, as a result of human activity. This is because the hordes of exotic species coming into ecosystems in the United States far exceed the number of species that are becoming extinct. Indeed, introductions may outnumber extinctions by more than ten to one, so that the United States is becoming more and more species-rich all the time largely as a result of human action. n354 [\*908] Peter Vitousek and colleagues estimate that over 1000 non-native plants grow in California alone; in Hawaii there are 861; in Florida, 1210. n355 In Florida more than 1000 non-native insects, 23 species of mammals, and about 11 exotic birds have established themselves. n356 Anyone who waters a lawn or hoes a garden knows how many weeds desire to grow there, how many birds and bugs visit the yard, and how many fungi, creepy-crawlies, and other odd life forms show forth when it rains. All belong to nature, from wherever they might hail, but not many homeowners would claim that there are too few of them. Now, not all exotic species provide ecosystem services; indeed, some may be disruptive or have no instrumental value. n357 This also may be true, of course, of native species as well, especially because all exotics are native somewhere. Certain exotic species, however, such as Kentucky blue grass, establish an area's sense of identity and place; others, such as the green crabs showing up around Martha's Vineyard, are nuisances. n358 Consider an analogy [\*909] with human migration. Everyone knows that after a generation or two, immigrants to this country are hard to distinguish from everyone else. The vast majority of Americans did not evolve here, as it were, from hominids; most of us "came over" at one time or another. This is true of many of our fellow species as well, and they may fit in here just as well as we do. It is possible to distinguish exotic species from native ones for a period of time, just as we can distinguish immigrants from native-born Americans, but as the centuries roll by, species, like people, fit into the landscape or the society, changing and often enriching it. Shall we have a rule that a species had to come over on the Mayflower, as so many did, to count as "truly" American? Plainly not. When, then, is the cutoff date? Insofar as we are concerned with the absolute numbers of "rivets" holding ecosystems together, extinction seems not to pose a general problem because a far greater number of kinds of mammals, insects, fish, plants, and other creatures thrive on land and in water in America today than in prelapsarian times. n359 The Ecological Society of America has urged managers to maintain biological diversity as a critical component in strengthening ecosystems against disturbance. n360 Yet as Simon Levin observed, "much of the detail about species composition will be irrelevant in terms of influences on ecosystem properties." n361 [\*910] He added: "For net primary productivity, as is likely to be the case for any system property, **biodiversity matters only up to a point**; above a certain level, increasing biodiversity is likely to make **little difference**." n362 What about the use of plants and animals in agriculture? There is no scarcity foreseeable. "Of an estimated 80,000 types of plants [we] know to be edible," a U.S. Department of the Interior document says, "only about 150 are extensively cultivated." n363 About twenty species, not one of which is endangered, provide ninety percent of the food the world takes from plants. n364 Any new food has to take "shelf space" or "market share" from one that is now produced. Corporations also find it difficult to create demand for a new product; for example, people are not inclined to eat paw-paws, even though they are delicious. It is hard enough to get people to eat their broccoli and lima beans. It is harder still to develop consumer demand for new foods. This may be the reason the Kraft Corporation does not prospect in remote places for rare and unusual plants and animals to add to the world's diet. Of the roughly 235,000 flowering plants and 325,000 nonflowering plants (including mosses, lichens, and seaweeds) available, farmers ignore virtually all of them in favor of a very few that are profitable. n365 To be sure, any of the more than 600,000 species of plants could have an application in agriculture, but would they be preferable to the species that are now dominant? Has anyone found any consumer demand for any of these half-million or more plants to replace rice or wheat in the human diet? There are reasons that farmers cultivate rice, wheat, and corn rather than, say, Furbish's lousewort. There are many kinds of louseworts, so named because these weeds were thought to cause lice in sheep. How many does agriculture really require? [\*911] The species on which agriculture relies are domesticated, not naturally occurring; they are developed by artificial not natural selection; they might not be able to survive in the wild. n366 This argument is not intended to deny the religious, aesthetic, cultural, and moral reasons that command us to respect and protect the natural world. These spiritual and ethical values should evoke action, of course, but we should also recognize that they are spiritual and ethical values. We should recognize that ecosystems and all that dwell therein compel our moral respect, our aesthetic appreciation, and our spiritual veneration; we should clearly seek to achieve the goals of the ESA. There is no reason to assume, however, that these goals have anything to do with human well-being or welfare as economists understand that term. These are ethical goals, in other words, not economic ones. Protecting the marsh may be the right thing to do for moral, cultural, and spiritual reasons. We should do it-but someone will have to pay the costs. In the narrow sense of promoting human welfare, protecting nature often represents a net "cost," not a net "benefit." It is largely for moral, not economic, reasons-ethical, not prudential, reasons- that we care about all our fellow creatures. They are valuable as objects of love not as objects of use. What is good for   [\*912]  the marsh may be good in itself even if it is not, in the economic sense, good for mankind. The most valuable things are quite useless.

### 2AC – Oceans are Resilient

#### Environment Resilient - BP Gulf Proves

Waters 12, web producer, editor and writer for the Ocean Portal at the Smithsonian National Museum of Natural History. She received Biology and Latin degrees from Minnesota’s Carleton College, “The Oil Spill, Two Years Later,” http://ocean.si.edu/blog/oil-spill-two-years-later

Two years ago last week, on April 20, 2010, an explosion on the oil-drilling rig Deepwater Horizon caused the largest marine oil spill in history, gushing nearly 5 million barrels of crude oil over the course of three months. And, since then, researchers have been hard at work to understand how the oil spill impacted life in the Gulf of Mexico. It’s too soon to say whether the ecosystem is out of the red – it’s only been two years, after all! – but many researchers have been shocked at the ecosystem’s recovery. “Like everybody else, I had visions of just gobs and gobs of oil smothering thousands of acres of salt marsh,” says James Morris, who studies marshland plants at the University of South Carolina. “But that didn’t really happen.” As you can see in this slideshow, the marsh grasses are growing back despite being killed off two years ago by the oil. “The plants out there are really tough as nails,” says Morris. “Animals will probably be more susceptible than the plants are, but plants, after all, are the foundation of the ecosystem. If the plants are there, the animals will come back.” While the Gulf is not oil-free, far less of the oil stuck around than scientists expected – thanks, in part, to oil-eating microbes. Because there are many natural oil seeps on the Gulf’s seafloor, these microbes already called the Gulf home and were more than happy to feed on the new source of food introduced by the spill. The water in the Gulf is also very warm – especially compared to Alaskan waters, where the last major US oil spill occurred in 1989 – boosting the microbes’ metabolisms and enabling them to gobble up the oil faster. These are good signs for the ecosystems as a whole, but it doesn’t mean everything is coming up roses. Scientists still have much to learn: how long the oil will stay in the food chain; whether the coral communities will rebound; whether dolphins and other marine mammals will return; whether the fisheries – including the endangered Bluefin tuna -- will recover. And it’s going to take more years of research to tease apart what changes are the results of the spill or dispersant chemicals used to clean up the spill, and which are just normal variations in the ecosystem. For example, soon after the oil spill, researchers noticed that the number of small fish in the Gulf had decreased pretty dramatically. At first they were worried: had the oil destroyed their nursing grounds? But it’s also possible that the fishing ban, which went into effect soon after the spill, allowed predatory fish to rule the waters – snacking on every small fish in sight. It could be the nursing grounds, the fishing ban, some combination of the two, or other unknown factors. Only one thing is certain: that scientists need more time to fully understand the impacts of the oil spill. “There’s still a lot we don’t know about how this spill altered the food web of the Gulf of Mexico ecosystem,” says Samantha Joye, who studies marine chemistry and microbes at the University of Georgia. “We’re trying to understand very complicated interactions and feedbacks in a dynamic, constantly-changing system, and it’s going to take time.”

## Invasive Species DA – 1AR

### Extend: “Offshore Wind Improves Biodiversity”

#### Wind farms are the perfect artificial reefs --- boost ecosystem diversity.

[Olivia Langhamer](http://www.hindawi.com/28064185/), December 2012. Department of Biology, Norwegian University of Science and Technology, Høgskoleringen. “Artificial Reef Effect in relation to Offshore Renewable Energy Conversion: State of the Art,” The Scientific World Journal, http://www.hindawi.com/journals/tswj/2012/386713/.

Artificial offshore constructions will inevitably be colonized by a number of organisms. This should be considered when constructing for example scour protections with their potential to enhance the reef effect for higher biodiversity or commercial interesting species. Artificial reefs generally hold greater densities and biomass of fish and decapods, and provide higher catch rates, compared to surrounding soft bottom areas, and in several cases also in relation to adjacent natural reefs [[17](http://www.hindawi.com/journals/tswj/2012/386713/#B17)–[24](http://www.hindawi.com/journals/tswj/2012/386713/#B24)]. There are, however, some studies that show no significant impacts of artificial reefs on fish assemblages [[25](http://www.hindawi.com/journals/tswj/2012/386713/#B25)]. The proposed reasons for higher abundance and diversity of fish on and around artificial reefs differ among organisms. The most important seems to be the provision of shelter from both predation and water movements, and enhanced feeding grounds. Fish also seem to use the structures as reference points for spatial orientation [[18](http://www.hindawi.com/journals/tswj/2012/386713/#B18), [19](http://www.hindawi.com/journals/tswj/2012/386713/#B19), [26](http://www.hindawi.com/journals/tswj/2012/386713/#B26)].

Coming at the base of wind power farms, scouring protections may have a potential in terms of altering the nature of the seabed in the vicinity of wind farms. In that way different shapes and sizes may create different habitats and thus dictate what kind of organisms colonize for living and feeding. Wind farms are usually constructed on soft bottom substrate for technical reasons, and this contributes to higher complexity in three-dimensional scale. Therefore, scour protections have the potential to turn exposed, biodiversity-poor soft bottoms into species rich ecosystems. When the conditions are ideal, wind park foundations will become heavily colonized by organisms abundant in the water mass or nearby hard-bottom habitats. The colonisation is highly dependent on sufficient number of larvae and suitable environmental conditions [[27](http://www.hindawi.com/journals/tswj/2012/386713/#B27)]. On the other hand habitat mitigation can occur depending on the location of the renewable energy installations. Therefore, adequate location decision is important to prevent negative impacts in areas where red-listed or key-species exist.

Recruitment of marine organisms primarily occurs in two different ways when new constructions such as scour protections are set in place: by migration from the surrounding substrate or by settling of larvae. The recruitment will be governed by the local hydrodynamic regime [[28](http://www.hindawi.com/journals/tswj/2012/386713/#B28)] carrying the larvae to the wind farm, and then it will depend on its material and textures [[29](http://www.hindawi.com/journals/tswj/2012/386713/#B29)], and on the location of the scour protection in respect of water depth [[30](http://www.hindawi.com/journals/tswj/2012/386713/#B30)], salinity and temperature [[31](http://www.hindawi.com/journals/tswj/2012/386713/#B31)–[33](http://www.hindawi.com/journals/tswj/2012/386713/#B33)], and so forth. An initial macromolecule film, bacteria, microalgae, and fungi colonising the surface of scour protections may either favour or deter the settlement of larvae [[34](http://www.hindawi.com/journals/tswj/2012/386713/#B34)]. The colonisation will often have a characteristic succession, starting with diatoms and filamentous algae, followed by barnacles, and thereafter by a more diverse community [[35](http://www.hindawi.com/journals/tswj/2012/386713/#B35)]. There will be differences in the composition of fouling communities at particular depths on the scour protections. However, there is a high probability that scour protections will create increased heterogeneity in the area that is of great importance for species diversity and density. The size, diversity, and density of organisms on and in an artificial reef are conditional on the number and size of niches and not necessarily the presence of food. The conditions for the supply of nutrients are well established since offshore energy installations in shallow waters (<30 m) are built in areas with higher water turbulence efficiently transporting food, oxygen, and carbon dioxide. The extent to which scour protections may attract marine organisms and the species attracted will largely be dictated by the design of the components of the installation, with structural complexity of exposed surfaces being an important factor [[36](http://www.hindawi.com/journals/tswj/2012/386713/#B36), [37](http://www.hindawi.com/journals/tswj/2012/386713/#B37)].

#### No Link-German studies also demonstrate no negative impacts --- opponents aren’t even against offshore wind, they just say we need to be careful.

Louise Osborne, 1/24/2014. “Booming German offshore wind power industry puts pressure on marine life,” Deutsch Welle, http://www.dw.de/booming-german-offshore-wind-power-industry-puts-pressure-on-marine-life/a-17339633.

A recent report released by Germany's Federal Maritime and Hydrographic Agency, known as the BSH, on the wind farm Alpha Ventus has sought to soothe conservationists' fears. According to the report, the effects on fish, birds and marine mammals are minimal.

Conducted over five years, the study looked at the ecological effects of the 12 turbines at Alpha Ventus, a test site run jointly by energy firms EWE, E-ON and Vattenfall, 60 kilometers off the German coast in the North Sea. It revealed an increase in the biodiversity at the bases of the turbines.

"Life on the ground had very much intensified because small life-forms such as mussels, starfish and sea anemones, were able to find a new surface on which to grow and multiply, much stronger than on the sand that was already there," said Monika Breuch-Moritz, president of the BSH.

"That is actually just a normal result, you see similar things on every shipwreck," she told DW.

[Hearing loss](http://www.dw.de/booming-german-offshore-wind-power-industry-puts-pressure-on-marine-life/a-17339633) for animals

Although there are still concerns about birds getting stuck and killed while flying across the path of the massive wind turbine blades, one of the biggest concerns for conservationists relates to harbor porpoises, mammals which depend on their sense of hearing to hunt and navigate. According to the report, the animals were at times driven up to 20 kilometers from the sound of construction.

"If sounds become too intense, there's going to be severe damage to the harbour porpoise,” said Ritter. “If they become deaf, that's a death sentence for them."

Companies are required to limit noise to 160 decibels – the same level of noise as a jet plane taking off – at a distance of 750 meters away from[construction sites](http://www.dw.de/booming-german-offshore-wind-power-industry-puts-pressure-on-marine-life/a-17339633). The German environment ministry also implemented new requirements in December as part of a noise [prevention](http://www.dw.de/booming-german-offshore-wind-power-industry-puts-pressure-on-marine-life/a-17339633) concept. Guidelines require measures such as bubble[curtains](http://www.dw.de/booming-german-offshore-wind-power-industry-puts-pressure-on-marine-life/a-17339633), where air bubbles are released from the seabed to create a sound-insulating barrier.

While Breuch-Moritz said the move was important, she added that the study had found porpoises returning to the site following the end of construction.

"As soon as the pile-driving is over, the porpoises come back," said Breuch-Moritz. "The operation of a wind farm, not the construction, doesn't disturb the porpoises."

Cumulative effects

Still, conservationists say the report does not take into account the cumulative effects of the many wind farms being built off Germany's north coast and say the noise prevention concept, which is only in effect for the North Sea, should be extended to also cover the Baltic Sea.

According to the German Offshore Wind Energy Foundation, which works closely with the German environment ministry, offshore wind turbines generated 520 Megawatts (MW) of electricity in September 2013. The government plans to increase that figure to 25,000 MW by 2030.

"We're not talking about one site, but hundreds over decades," says Fabian Ritter. "You could say you are changing an ecosystem, sound-wise."

Even so, Andreas Wagner, manager of the German Offshore Wind Energy Foundation's Berlin office, which worked with the energy firms to build the Alpha Ventus wind farm, said there was a lot of effort being taken by industry to reduce the potential ecological impacts.

"We have more than half a dozen commercial offshore wind farms under construction right now, but they are not all being built at the same time and not installing the foundations at the same time, so there are not many cumulative effects in reality," he said.

Many conservationists say they do not want to see less development in the sector of offshore wind energy, but greater consideration of the potential effects of offshore wind farms.

#### Link Turn-Wind Farms increase marine life

Mann and Teilmann 13

“Environmental impact of wind energy” J Mann1 and J Teilmann2 28 May 2013 <http://iopscience.iop.org/1748-9326/8/3/035001/pdf/1748-9326_8_3_035001.pdf> Department of Wind Energy, Technical University of Denmark (Merkley)

Both studies did observations both before and after the installation of the turbines using acoustic data loggers placed on the sea bottom inside and outside the wind farm. Scheidat et al ( [201](#page4)1) found a significant increase of 160% in the presence of porpoises 1–2 years after the wind farm was in normal operation, compared to the baseline period (the construction period was not studied). It was suggested that this could be caused by less ship traffic and more food due to the ban of fishery inside the wind farm.

### Extend: “Aquaculture Improves Biodiversity”

#### Establishing requirements will motivate the industry to adopt innovative technology and strategies to protect the environment --- market forces alone will fail

Klinger & Naylor, 12 --- \*Ph.D. student in Stanford's Emmett Interdisciplinary Program in Environmental and Resources, AND \*\*professor of environmental Earth system science at Stanford (Dane & Rosamond, “Searching for Solutions in Aquaculture: Charting a Sustainable Course,” <http://woods.stanford.edu/sites/default/files/files/searching%20for%20solutions%20in%20aquaculture.pdf>, JMP)

POLICY AND INFORMATION APPROACHES

The aquaculture sector has a wide range of innovative technologies and management strategies at its disposal to improve its overall environmental performance as it continues to expand. The question is: Will the industry take advantage of these innovations, particularly if the costs of adopting new approaches are initially high? Price signals often provide inducement for technological change and the adoption of improved management, yet capitalism fails to set a sustainable path when the social costs of aquaculture production— namely ecosystem damages—are not priced in the market. Substantial volatility in global commodity prices since ∼2005 has further obscured market signals to producers. Policy interventions, international standards, labeling, and information strategies can help provide incentives to producers to adopt improved technologies and management practices, but they can also be counterproductive or confusing to producers and consumers (5).

To create the right incentives for widespread adoption of the innovations outlined in this review, governments promoting aquaculture need to establish enforceable standards that set clear limits on ecosystem damage, pollution, and resource use. Standards are required for aquaculture operations and siting, as well as for the flow and cumulative impact of nutrient and chemical effluents, pathogen transmission, fish escapes, and invasive species related to aquaculture activities (122). In addition, the establishment of a monitoring system, liability criteria for violations of standards, and a transparency process for public participation are needed to ensure the desired social outcome (122).

A wide range of scientific guidelines and information approaches has emerged to help policy makers and businesses set environmental standards and identify best practices and technologies for aquaculture development. Examples include the use of life-cycle assessments, the global aquaculture performance index, United Nations Food and Agriculture Organization codes of conduct, and business social performance standards (as reviewed by Reference 5). Numerous certification schemes are also available to producers to capture higher returns; although they provide a valuable service to society, they can be extremely costly to producers because there is little coordination among the various schemes. As a result, firms trying to establish a socially responsible global business must meet the demands and inspections of multiple groups.2 Organic certifications are also used in aquaculture when feed sources can be tracked (e.g., Reference 196) but are of limited value as they focus only on inputs to production and do not necessarily curb harmful outputs such as effluents, escapes, and pathogens.

#### Aquaculture is inevitable and it can be made environmentally safe

Kite-Powell, 11 --- aquaculture policy specialist at Woods Hole Oceanographic Institution (9/21/2011, Hauke, interview by Kate Madin, “Where Will We Get Our Seafood? Unlike the rest of the world, the U.S. has not embraced aquaculture,” http://www.whoi.edu/oceanus/feature/where-will-we-get-our-seafood, JMP)

What do you hope people take away from this colloquium?

Kite-Powell: The main thing is that we can do things to increase seafood production in the U.S. that are ecologically and economically sound, and that seafood and fishing industries and the environmental community can find common ground on this issue. It's not a black-or-white situation where all seafood farming is environmentally harmful. If it's done right, it's a good thing. And whether we like it or not, aquaculture will become more and more important in the future. There's just no getting away from that.

### Extend: “Invasive Species Don’t spread”

#### Invasive species aren’t automatically bad --- some non-indigenous species can help ecosystem resilience.

Jeffrey A. Crooks, May 2002. Smithsonian Environm. Res. Center and Romberg Tiburon Center, San Francisco State Univ. “Characterizing ecosystem-level consequences of biological invasions: the role of ecosystem engineers,” Oikos 97.2.

Invasions by exotic species represent both threats to ecosystems as well as opportunities to learn more about them. Among the invaders that will have the largest impacts are those that directly modify ecosystems and thus have cascading effects for resident biota. Exotics can affect ecosystems by altering system-level flows, availability, or quality of nutrients, food, and physical resources (e.g. living space, water, heat or light). The invader-mediated control of physical resources, typically achieved through the modification of habitats, has received limited attention in invasion biology. This reflects a general trend in ecology, and only recently has the concept of ecosystem engineering been developed to account for the role of species that shape habitats. Plants and animals in terrestrial and aquatic systems can both create and destroy structure. When introduced into ecosystems, these exotic engineers cause physical state changes with effects that ramify throughout the system. Although the consequences of these modifications are varied and complex, insight gained from general ecological principles offers an opportunity to predict what invaders will do upon their integration into systems. Examples from the literature suggest that introduced ecosystem engineers that increase habitat complexity or heterogeneity tend to cause abundances and/or species richness to rise, while those that decrease complexity tend to have the reverse effect. In assessing such patterns, however, it is critical to also consider spatial scales and the life habits of resident organisms. In addition to providing predictive power, recognition of engineering as a major means by which invasive species affect ecosystems provides a unifying theme for invasion biology and offers a chance to consider more fully the general role of species in ecosystems.

### Extend: “Alt Causes to Biodiversity Loss”

#### Development in the ocean harms the marine ecosystem

McAvoy 14, This author is also published by Google News, MSNBC, USA Today, The Huffington Post, Kansas City Star, and 12 more sources“In Hawaii, Saltwater Fish Are At The Center Of A Battle Over Conservation,” http://www.huffingtonpost.com/2014/06/26/hawaii-saltwater-aquariums-conservation-battle\_n\_5532141.html?utm\_hp\_ref=green

The group is focusing on filming and documenting to bring attention to what he called "a very fragile ecosystem out there that is being depleted for the sole benefit of a multi-billion dollar industry for the home and business hobbyist." Fish collectors say the filming isn't harmless, saying it could scare away skittish fish. West Hawaii's aquarium fish collecting rules date to the late 1990s, when the state Legislature, responding to concerns about declining fish stocks, banned fish collecting along sections of the coastline. Today, collecting is prohibited on 35 percent of the coast. Scientific surveys show yellow tang populations have jumped 88 percent in these areas since the regulations went into effect, said Brian Tissot, a Humbolt State University conservation biologist who has studied the fishery for decades. Numbers of goldring surgeonfish, the second most-caught aquarium fish, climbed 37 percent. The population growth has spilled over into areas where fish collecting is allowed. A local fisheries advisory council — made up of environmentalists, divers, fish collectors, tourism industry officials and others — recently moved to strengthen the regulations. Their new rules limit species that collectors may capture to a list of 40. Arielle Levine, a San Diego State University marine conservation expert who recently co-authored a paper on the success of the no-collection zones, said they're doing "an impressive job" of protecting and increasing fish populations. Other factors harming the area's coral reefs haven't been as well managed, she said. Reefs are being smothered when sediment and nutrients like fertilizer wash into the ocean from coastal housing and hotel developments. Algae-eating fish that would prevent excessive plant growth from choking the reefs are heavily fished for food. Andy Rhyne, an assistant professor at Roger Williams University and New England Aquarium research scientist, said the fishery's management could still be improved but regulations have "really worked." "This is not a debate or data or science. It's an emotional argument," Rhyne said.

#### Climate Change is the biggest threat to Marine ecosystems

National Geographic no date, “Marine Habitat Destruction,” http://ocean.nationalgeographic.com/ocean/critical-issues-marine-habitat-destruction/

Perhaps the most devastating of all habitat-altering agents, however, is climate change. Scientists are still coming to grips with the consequences that excessive atmospheric carbon dioxide and Earth's rapid warming are having on ecosystems. But there is ample evidence indicating that the oceans are bearing the brunt of these changes. As Earth's temperature rises, it is primarily the oceans that absorb the extra heat. Even small temperature changes can have far-reaching effects on the life cycles of marine animals from corals to whales. In addition, warmer temperatures cause excess melting of ice caps and glaciers, raising sea levels and flooding estuaries. High levels of atmospheric carbon dioxide, caused mainly by the burning of fossil fuels, are absorbed by the oceans, where the gas dissolves into carbonic acid. This elevated acidity inhibits the ability of marine animals, including many plankton organisms, to create shells, disrupting life within the very foundation of the ocean's food web.

#### Oceans are most affected by Warming

National Geographic no date, “Sea Temperature Rise,” http://ocean.nationalgeographic.com/ocean/critical-issues-sea-temperature-rise/

As climate change has warmed the Earth, oceans have responded more slowly than land environments. But scientific research is finding that marine ecosystems can be far more sensitive to even the most modest temperature change. Global warming caused by human activities that emit heat-trapping carbon dioxide has raised the average global temperature by about 1°F (0.6°C) over the past century. In the oceans, this change has only been about 0.18°F (0.1°C). This warming has occurred from the surface to a depth of about 2,300 feet (700 meters), where most marine life thrives. Perhaps the ocean organism most vulnerable to temperature change is coral. There is evidence that reefs will bleach (eject their symbiotic algae) at even a slight persistent temperature rise. Bleaching slows coral growth, makes them susceptible to disease, and can lead to large-scale reef die-off. Other organisms affected by temperature change include krill, an extremely important link at the base of the food chain. Research has shown that krill reproduce in significantly smaller numbers when ocean temperatures rise. This can have a cascading effect by disrupting the life cycle of krill eaters, such as penguins and seals—which in turn causes food shortages for higher predators.

#### Have to get rid of fossil fuels to solve

National Geographic no date, “Ocean Acidification,” http://ocean.nationalgeographic.com/ocean/critical-issues-ocean-acidification/

The oceans currently absorb about a third of human-created CO2 emissions, roughly 22 million tons a day. Projections based on these numbers show that by the end of this century, continued emissions could reduce ocean pH by another 0.5 units. Shell-forming animals including corals, oysters, shrimp, lobster, many planktonic organisms, and even some fish species could be gravely affected. Equally worrisome is the fact that as the oceans continue to absorb more CO2, their capacity as a carbon storehouse could diminish. That means more of the carbon dioxide we emit will remain in the atmosphere, further aggravating global climate change. Scientific awareness of ocean acidification is relatively recent, and researchers are just beginning to study its effects on marine ecosystems. But all signs indicate that unless humans are able to control and eventually eliminate our fossil fuel emissions, ocean organisms will find themselves under increasing pressure to adapt

#### Biodiversity loss is inevitable due to Ocean Acidification.

**Peace 09, “**Increasing Ocean Acidification Is Tipping Fragile Balances within Marine Ecosystems,” http://insideclimatenews.org/news/20091201/increasing-ocean-acidification-tipping-fragile-balances-within-marine-ecosystems

The increasing amount of carbon dioxide in the world's oceans is shifting fragile balances within marine ecosystems, and it could cause unpredictable changes for sea life ranging from corals to oysters to whales, scientists say. One threat is from acidification — a chemical process that occurs when carbon dioxide from the atmosphere is absorbed into sea water, causing the water's pH level to drop. As acidification increases, scientists now worry its effects on marine life may be more wide-ranging than previously predicted. In recent months, new threats to species and signs of shifting populations have raised alarm within the scientific community. The [Center for Biological Diversity](http://www.biologicaldiversity.org/) (CBD) took one protective step this fall when it filed a [petition](http://www.biologicaldiversity.org/species/invertebrates/staghorn_coral/pdfs/Coral%20petition_10-20-09.pdf) to list 83 species of coral under the federal Endangered Species Act. The group seeks to expand on its successful 2006 petition to list elkhorn corals and staghorn corals as “endangered,” a landmark decision that marked the U.S. government’s first official recognition of climate change as an existential threat to a species. Over the coming year, the National Oceanic and Atmospheric Administration, whose [Coral Reef Watch](http://coralreefwatch.noaa.gov/satellite/index.html) tracks the health of corals worldwide, will review CBD’s petition and determine whether to assign “endangered” status to each of the 83 species on the list.

### Extend: “No Impact to Biodiversity”

**No impact to biodiversity – previous mass extinctions prove**

National Geographic no date (“Mass Extinctions, What Causes Animal Die Offs?,” National Geographic, Date Provided by the Wayback Machine, 2010, science.nationalgeographic.com, Available Online: https://science.nationalgeographic.com/prehistoric-world/mass-extinction, Accessed: 09/02/2013)

More than 90 percent of all organisms that have ever lived on Earth are extinct. As new species evolve to fit ever changing ecological niches, older species fade away. But [the rate](##) of extinction is far from constant. At least a handful of times in the last 500 million years, 50 to more than 90 percent of all species on Earth have disappeared in a geological blink of the eye. Though these mass extinctions are deadly events, they open up the planet for new life-forms to emerge. Dinosaurs appeared after one of the biggest mass extinction events on Earth, the Permian-Triassic extinction about 250 million years ago. The most studied mass extinction, between the Cretaceous and Paleogene periods about 65 million years ago, killed off the dinosaurs and made room for mammals to rapidly diversify and evolve.

### Extend: “Oceans are resilient”

#### Marine ecosystems are resilient — no system collapse

Kennedy 2 — Victor Kennedy, PhD Environmental Science and Dir. Cooperative Oxford Lab (“Coastal and Marine Ecosystems and Global Climate Change,” Pew Center on Global Climate Change, Available Online: <http://www.c2es.org/docUploads/marine_ecosystems.pdf>, Accessed: 09/02/2013)

There is evidence that marine organisms and ecosystems are resilient to environmental change. Steele (1991) hypothesized that the biological components of marine systems are tightly coupled to physical factors, allowing them to respond quickly to rapid environmental change and thus rendering them ecologically adaptable. Some species also have wide genetic variability throughout their range, which may allow for adaptation to climate change.

#### No impact --- humans and the environment are adaptable

Doremus, 2000 – Professor of Law at UC Davis

(Holly, Washington & Lee Law Review, “The Rhetoric and Reality of Nature Protection: Toward a New Discourse,” Winter 2000, 57 Wash & Lee L. Rev. 11, JMP)

In recent years, this discourse frequently has taken the form of the ecological horror story. That too is no mystery. The ecological horror story is unquestionably an attention-getter, especially in the hands of skilled writers [\*46] like Carson and the Ehrlichs. The image of the airplane earth, its wings wobbling as rivet after rivet is carelessly popped out, is difficult to ignore. The apocalyptic depiction of an impending crisis of potentially dire proportions is designed to spur the political community to quick action. Furthermore, this story suggests a goal that appeals to many nature lovers: that virtually everything must be protected. To reinforce this suggestion, tellers of the ecological horror story often imply that the relative importance of various rivets to the ecological plane cannot be determined. They offer reams of data and dozens of anecdotes demonstrating the unexpected value of apparently useless parts of nature. The moth that saved Australia from prickly pear invasion, the scrubby Pacific yew, and the downright unattractive leech are among the uncharismatic flora and fauna who star in these anecdotes. n211 The moral is obvious: because we cannot be sure which rivets are holding the plane together, saving them all is the only sensible course.

Notwithstanding its attractions, the material discourse in general, and the ecological horror story in particular, are not likely to generate policies that will satisfy nature lovers. The ecological horror story implies that there is no reason to protect nature until catastrophe looms. The Ehrlichs' rivet-popper account, for example, presents species simply as the (fungible) hardware holding together the ecosystem. If we could be reasonably certain that a particular rivet was not needed to prevent a crash, the rivet-popper story suggests that we would lose very little by pulling it out. Many environmentalists, though, would disagree. n212

Reluctant to concede such losses, tellers of the ecological horror story highlight how close a catastrophe might be, and how little we know about what actions might trigger one. But the apocalyptic vision is less credible today than it seemed in the 1970s. Although it is clear that the earth is experiencing a mass wave of extinctions, n213 the complete elimination of life on earth seems unlikely.n214 Life is remarkably robust. Nor is human extinction probable any time soon. Homo sapiens is adaptable to nearly any environment. Even if the world of the future includes far fewer species, it likely will hold people. n215

One response to this credibility problem tones the story down a bit, arguing not that humans will go extinct but that ecological disruption will bring economies, and consequently civilizations, to their knees. n216 But this too may be overstating the case. Most ecosystem functions are performed by multiple species. This functional redundancy means that a high proportion of species can be lost without precipitating a collapse. n21

## Exploration DA – 2AC

### 2AC – Not Unregulated Exploration

#### No link – the plan is a systematic approach to ocean policy, not just unregulated exploration

Watkins et al, 4 – Admiral USN (Ret.), Chairman (James, D. --AN OCEAN BLUEPRINT FOR THE 21ST CENTURY “ENHANCING OCEAN INFRASTRUCTURE AND TECHNOLOGY DEVELOPMENT” US commission on Ocean policy pp. 67 http://www.opc.ca.gov/webmaster/ftp/pdf/docs/Documents\_Page/Reports/U.S.%20Ocean%20Comm%20Report/FinalReport.pdf)//gingE

Ecosystem-based management provides many potential benefits, but also imposes new responsibilities on managers. The need to collect good information and to improve under- standing is perhaps foremost among these new responsibilities. Despite considerable progress over the last century, the oceans remain one of the least explored and most poorly understood environments on the planet. Greater knowledge can enable policy makers and managers to make science-based decisions at the national, regional, state, and local levels. Existing research and monitoring programs, which tend to be agency- and issue-centric, should be reoriented to become ecosystem-based. This will help resolve the current mismatch between the size and com- plexity of marine ecosystems and the many fragmented research and monitoring programs for coastal and ocean ecosystems. In addition to the need for better understanding, the nation lacks effective mechanisms for incorporating scientific information into decision-making processes in a timely manner. As knowledge improves, it must be actively incorporated into policy through an adaptive process. To make this policy translation effective, local, state, regional, and national man- agers need an avenue to communicate their information needs and priorities. Better coordination can facilitate more efficient use of existing funds. However, to significantly improve U.S. management of oceans and coasts and make ecosystem-based management a reality, the nation will need to commit to greater investments in ocean science, engineering, exploration, observations, infrastructure, and data management. Increased investments will help restore the pre-eminence of U.S. ocean capabilities, which has eroded since the end of the Cold War. Although multiple use conflicts are common in coastal and ocean environments, efforts to understand the social, cultural, and economic dimensions of ocean issues have received surprisingly little support. Because of this, studies of humans and their behavior—so critical to virtually every ecosystem—deserve special emphasis.

### 2AC – Status Quo Solves

#### **Current programs exist to protect against bad sea mining polices – even if the affirmative creates unregulated exploration – status quo solves bad mining procedures.**

Markussen 94 [Jan Magne Markussen (1994), ‘Deep Seabed Mining and the Environment: Consequences, Perceptions, and Regulations’, in Helge Ole Bergesen and Georg Parmann (eds.), Green Globe Yearbook of International Co -operation on Environment and Development 1994 (Oxford: Oxford University Press), 31–39.]

In 1991 the United Nations Preparatory Commission for the International Sea-Bed Authority and for the International Tribunal for the Law of the Sea had dealt with Draft Regulations on Prospecting, Exploration, and Exploitation of Polymetalic Nodules in the Area. The general attitude amongst participants at the informal consultations held in August 1992 was that the environmental consequences would be ‘manageable’. Comprehensive studies of environmental consequences of deep seabed mining carried out in several countries concluded that the consequences would hardly be so serious as to, for instance, put a stop to future commercial exploitation. Environmental organizations in the USA are not particularly concerned about the issue, and do not represent a pressure group. One reason is the assumption that commercial exploitation is not yet imminent.

### 2AC – NOPP Improves Oceans

#### New science funding is vital to informed decision-making to protect the oceans

Rosenberg, 11 - Senior Vice President for CI’s Science and Knowledge division (Andrew, Human Nature Conservation June 8th, 2011 “U.S. Ocean Policy Should Lead the Way for Global Reform” http://blog.conservation.org/2011/06/u-s-ocean-policy-should-lead-the-way-for-global-reform/)//gingE

At Conservation International, we know that while humans are mostly confined to the quarter of the planet covered by land, we are surrounded — and sustained — by vast oceans. In addition to supporting incredible biodiversity, oceans provide benefits to people in the form of food, energy, recreation, tourism and desirable places to live. They are also a tremendous economic driver, generating an estimated 69 million jobs and over $8 trillion dollars in wages per year in the United States alone. From renewable energy sources like wave and wind power to offshore aquaculture and deep-sea bioprospecting, our oceans and coasts provide new opportunities for technology developers, manufacturers, engineers and others in a vast supply chain to discover, innovate and develop new economic opportunities around the globe. America can lead this global innovation. Unfortunately, the health of our oceans is in serious decline; in too many places, coastal water quality is poor, fisheries are stressed, habitats for ocean life are degraded and endangered marine species are struggling to recover. Disasters such as last year’s BP oil spill have damaged the oceans and their inhabitants, which in turn has stressed the communities and industries that depend on healthy oceans. To turn the tide, our national, state and local leaders must make a commitment to more coordinated management of ocean resources. Our decisions must be based on sound science, and scientific work must be a funding priority in order for us to gain the benefits the oceans can provide. The Joint Ocean Commission Initiative recently released America’s Ocean Future, a report that calls on leaders to support full and effective implementation of our nation’s first national ocean policy — the National Policy for Stewardship of Ocean, Coasts and Great Lakes — which was established by President Obama in July of 2010. As I mentioned in an earlier post, the national ocean policy has the potential to act as a catalyst for long-awaited and important reforms, including enhanced monitoring, assessment and analysis of the condition of our ocean ecosystems, how they affect and are affected by human activity and whether management strategies are achieving our environmental, social and economic goals. Using these tools to better understand our oceans will help us to more effectively manage these resources and strengthen coastal economies and communities across the country. As a member of the Joint Initiative’s Leadership Council and an advisor to the Interagency Ocean Policy Task Force, I believe that monitoring what is happening in our oceans is critical to understanding how the physical, biological, chemical and human elements of ocean ecosystems interact. The Joint Initiative report recommends fully supporting an ocean observation system that would integrate data from sensors at the bottom of the ocean, from buoys on the ocean’s surface and from satellites with remote sensing technology high above the Earth. The report also emphasizes the importance of better integrating the study of our planet’s climate and ocean systems. We need to have a better understanding of how climate change affects the health of our oceans and marine life in order to develop strategies to mitigate negative consequences on ocean ecosystems and coastal communities. The report notes that “information about climate impacts will be particularly important for coastal areas with infrastructure that is vulnerable to rising sea levels and strong coastal storms, including communities with naval facilities and transportation and energy infrastructure near the coast.” The development of expanded and improved science, research and education around our oceans is a sound investment in improving our economy. The data and information collected from research activities will be used to inform coastal development, promote sustainable and safe fishing practices, and develop vibrant marine-based recreation and tourism. And promoting the education of our next generation of marine scientists will help us compete in a global economy increasingly driven by scientific and technological innovation. Our oceans are in crisis, and our national economy is suffering the decline of this important economic engine. For every year that we wait to institute a national ocean policy, we lose jobs and income that rely on healthy oceans, and miles of healthy coastlines for Americans to enjoy. We can do better by supporting the science and policy changes that continuously improve our stewardship of the 70 percent of the world that is our oceans.

## Exploration DA – 1AR

### Extend: “NOPP Improves Oceans”

**Increases in ocean exploration key to solve biodiversity**

**NRC, ’03** (Committee on Exploration of the Seas, National Research Council “Exploration of the Seas: Voyage into the Unknown” pg. 43-46 National Academies Press <http://www.nap.edu/catalog.php?record_id=10844>) //GY

MARINE BIODIVERSITY

Exploitation of the genetic diversity of ocean life and long-term management of commercial fisheries will require a thorough knowledge and cataloging of resources. To date, just a fraction of the world’s marine species have been scientifically named or taxonomically identified (Winston, 1992; World Resources Institute, 2001). New species, including corals, fishes, and plants, are discovered on virtually every expedition that seeks to uncover them. Even microorganisms, such as Archaea, a primitive form of life, have been discovered by happenstance in places where conditions of temperature and pressure are so extreme, no life would be expected (National Research Council, 1995). The recent realization of the abundance and distribution of deep, cold-water corals (Box 3.1, Figure 3.1) is another example. Ocean exploration offers the opportunity to make such discoveries in a coordinated and systematic way. If little is known about the biodiversity in the oceans, even less is known about the abundance of organisms, their ecological functions, how food webs are structured, and how vast areas of the oceans are interconnected through biological interactions. A reliable, well-organized, and accessible inventory of existing and newly discovered marine species will promote scientific and public understanding of marine ecosystems. The Census of Marine Life is an exciting program of international research for assessing and explaining the diversity, distribution, and abundance of marine organ- isms throughout the world’s oceans (Consortium for Oceanographic Research and Education, 2002). Collaborative projects involving more than 60 institutions from 15 countries began the Census of Marine Life in 2000 with funding from the Alfred P. Sloan Foundation and the National Oceanographic Partnership Program member agencies. The Ocean Biogeographic Information System, the information component of the Census of Marine Life, will be a critical component of an integrated ocean observing system. Currently managed as a federation of database sources, the Ocean Bio- geographic Information System is expected to develop into a globally distributed network of species-based, geographically referenced databases that will be available to a variety of users, including ecosystem managers, fisheries organizations, and coral-reef-monitoring programs.Because even remote areas of the ocean contain detectable amounts of contaminants (Group of Experts on the Scientific Aspects of Marine Environ- mental Protection, 2001), the extent to which humans directly and indirectly affect marine ecosystem health and productivity can be observed, if not yet quantified. Ultimately, a better understanding of marine systems and the effects of human activities on them will enable wiser stewardship of the oceans’ vast resources. The marine biodiversity theme area highlights the interdisciplinary nature of the proposed ocean exploration program, the proposal and funding selection process, and the utility of such a program. A few particularly exciting areas for exploration of marine biodiversity include microbial life within the ocean, extreme environments such as hydrothermal vents, the subseafloor biosphere, coral reefs, seamounts, and continental shelves.