(Optional) Describe which area(s) you may be interested in for synthesis and what kind of experts you would like to bring together for this synthesis.
- General/Broad Topic: Examining relative roles of plasticity, local adaptation and connectivity in changing marine envts. -Specific/Focused Topic: Synthesizing current understanding of and identifying future research needs in the topic of CC impacts on key traits of growth rates and body sizes, and the roles of plasticity and adaptation in determining outcomes. -Both ideas would need: experts in marine ecology (with expertise in bio/phys. forces, and/or additional experts oceanography), ecophysiologists and evolutionary biologists
(1) Adaptation in marine metapopulations; (2) Cryptic speciation in the sea
1) Role of evolutionary adaptation versus plasticity in the response of marine species to global change. 2) Integrating approaches (genes to populations) to understand adaptive responses in the ocean. This requires a mix of evolutionary biologists/ecologists, molecular biologists and oceanographers.
A key question is *whether* marine populations will evolve rather than shift distribution, typically, in response to climate change. I think Erik Sotka has great insights on this, also Sinead Collins.
A potential topic of interest for synthesis is how animals cope with oceanographic gradients (e.g., frontal zones). These—from the perspective of a planktonic organism—are instances of facing the extremes over a small timeframe and, thus, may be akin to climate-related changes. For synthesis, bringing physiologists, oceanographers, ecologists, and microbiologists may be beneficial.
Adaptation in the face of temporally variable dispersal Influence of species range position on evolutionary & ecological processes Evaluating synergisms between climate change and invasive species Extracting generalities and usable principles for conservation and management to promote evolutionary resilience
Adaptation to stress in marine animals, Molecular markers in the adaptation, Coral bleaching and similar. I think that experts from different fields and also different carrier stages should discuss their points of view together.
Biogeography - specifically the biotic interactions hypothesis as an evolutionary mechanism driving the latitudinal diversity gradient (biogeographers, ecologists) Range expansions/limits - a perspective examining the ecological processes (species interaction strength) and evolutionary mechanisms (dispersal, adaptation, selection) that maintain range limits and how this relates to a changing environmental regime Local adaptation - currently working on a project to quantify LA across latitudinal (oceanographic) and local (estuarine) spatial scales (oceanographers, ecophysiologists, organismal ecologists)
enhance the link between evolutionary biology and marine ecology and make the ecological projection models accessible to evolutionary biologists
Evolution, genomics, phylogenetics.
Evolutionary biology in climate change adaptation strategies Ideally, experts in evolutionary biology (strong theoretical background), social science (especially those working knowledge exchange between academia and stakeholder/governments), conservation biologists (not just scientist but also experts working with NGOs/Government using interventions to aid adaptation of species and human populations to climate change). In terms of names some examples are: Carla Sgro, Ary Hoffman, Alistair Hobday, Christopher Cvitanovic; Morgan Kelly; Gretta Pecl
Evolutionary genetics, population genomics, host-microbe co-evolution
Following on my previous answer, I think we are just beginning to understand the multifaceted responses to climate change - including behavior changes, demographic changes, and evolutionary rescue or loss of genetic diversity, but many of these same responses have been observed in fished (and overfished) populations. I think it would be interested to develop a conceptual framework of the similarities and differences in responses to fishing and climate, and potential synergy or antagonism between selection from these processes.

For many papers, we seem to always reach an end point of identifying potential genes under selection and what they might be functionally enriched in. I am interested in synthesizing what we have discovered as a consensus using these approaches. From my reading of the literature, it seems that there is an overall ubiquitous functional response to stress. I would be interested in trying to identifying common functional categories for dealing with stress and then taking this to the next step. Many studies end with a hypothesis about a certain gene's involvement in adaptation, and I would like to see the field progress towards validating the importance of specific genes or general functional groups (such as measuring correlations between gene expression and protein levels). This would involve bringing in experts from many fields, such as physiologists, geneticists, genomicists, and cell and molecular biologists.
I am deeply interested in understanding the observed behaviors that modulate larval dispersal.
I am especially interested in how local adaptation and climate refugia may determine species' responses to climate change.
I am especially interested in participating in any synthesis/comparison of statistical approaches to quantifying local adaptation. I'm also increasingly interested in how clonality (and mating system, more broadly) influences population response to environmental change.
I am interested in combining molecular evolution with functional genomics.
I am interested in factors that affect adaptive capacity or the likelihood of evolutionary rescue. I am also interested in how ecological responses to environmental change may feed back to influence the evolution of populations.
I am interested in how intra-lifespan mechanisms of stress tolerance (physiological plasticity, acclimatization) interact with multi-generational mechanisms of stress tolerance and adaptation.
I am interested in marine dispersal and the evolutionary, ecological, and management implications of altered dispersal patterns in a future ocean. I am also interested in trait-based approaches to mechanistically predict species susceptibility to changing ocean conditions. I would be interested in bringing together marine ecologists, oceanographers, physiologists, and evolutionary ecologists.
I am interested in working with other scientists to study issues of marine disease and ecoimmunology. I propose bringing together marine immunologists, disease ecologists, and evolutionary biologists to conduct a synthetic analysis of patterns of increasing disease and resulting organismal response in a diversity of marine systems. I believe this is an understudied topic which will provide new insights regarding the broad taxonomic effects of increasing disease in the oceans, and future adaptation under projected scenarios.
I am particularly interested in how temporal variability shapes marine populations, especially how stochasticity can disrupt heritable responses within a species and also disrupt species interactions. I am also interested in physiological plasticity and epigenetics, as this is another major theme of my research. I believe these two research areas go hand in hand, as temporal variability in environmental conditions can drive adaptive plasticity, and this plasticity may be heritable on different timescales. These themes would benefit from a mix of experts in dynamic climate modeling, transgenerational plasticity responses (i.e. epigenetics), community ecology modeling, and population genetics. It is important to have a diverse group of individuals that can approach the question from multiple angles, so that an integrative approach is achieved. I personally have expertise in transgenerational plasticity and community ecology, and would be excited by the opportunity to contribute to this type of working group.
I am particularly interested in questions related to local adaptation and phenotypic plasticity to understand and predict population responses to environmental change, as these are both topics that I am currently studying in salt marsh and seagrass systems using a combination of greenhouse common garden, field reciprocal transplant, and molecular genetic approaches. I am also looking forward to incorporating dispersal into the synthesis, as I am examining population structure and connectivity in oysters and the implications for host-parasite dynamics on oyster reefs. Lastly, because much of my work is in highly variable coastal systems, I am very interested in topics related to spatial and temporal variability and how consideration of different scales of environmental variation in marine systems may better inform our understanding of evolutionary patterns and processes. Because I am committed to continuing to foster diversity and inclusion across multiple disciplines, I would like to bring together scientists at multiple career stages and with different backgrounds to address these questions.
I am particularly interested in testing emerging theoretical predictions for adaptation in rapidly deteriorating environments. In the context of the RCN, I would hope to bring together individuals interested in evolutionary theory and computational methods for analyzing for genomic datasets (particularly allele frequency analysis from pool-seq studies).

I focus more on the ecological implications of local adaptation and plasticity, and so topics of experimental design, ecological role, plasticity, and tradeoffs would be of interest to me.
I have the most experience applying marine genomics to corals, but am also interested in studying microbial communities and Molluscan responses to environmental change.
I think a synthesis of how to integrate lab experiments with population genomics to study the mechanistic basis for observed patterns in adaptation would be interesting and useful, which could take the form of a set of guidelines for how to ensure lab experiments are useful for population genomics and vice versa. This could also serve as the starting point for a conversation with modelers on i) what kind of data is useful for models of adaptation, and ii) how models can be used to inform experiments. I also think further comparison of patterns in adaptation across spatial scales between marine and terrestrial systems is warranted, especially in the identification of possible reasons why differences may be observed.
I would be best suited to work on environmental adaptation in marine invertebrates. This synthesis would be benefitted by experts in long-read (i.e. nanopore or pacbio) sequencing technologies in marine invertebrates (which are generally characterized by many repeat regions and high heterozygosity), experts in reduced representation library preparation and analysis as this is arguably the most affordable and widely used method in the field, and a quantitative geneticist to better understand the genetic basis of phenotypic adaptation. For these three areas respectfully, Dr. Noriyuki Satoh or Dr. Joseph Ryan, Dr. Jonathan Puritz, and Dr. Patrick Phillips would be excellent candidates to bring together for this synthesis. Through this combination of experts, we would be well-suited to investigate the genomics of adaptation in marine invertebrates.
I would be interested in a working group that focused on epigenetics. Because environmental epigenetics in marine systems is still in its early stages, it would be nice to include experts that have done some work in terrestrial systems in which many more epigenetic studies have been conducted. I would also be interested in discussing how the dispersal and life history of marine organisms impact evolutionary dynamics. For this area, I would be interested in including experts with a background in biological and physical oceanography.
I would be interested in bringing together experts who use NGS and those who use quantitative comparisons of fitness to help develop a framework of best-practices for studying local adaptation in non-model species with limited molecular resources.
I would be most interested in a working group that combined some subset of evolutionary biology, adaptation, and global change.
I would be particularly interested in areas related to reconstruction of demographic history and the integration of multiple data types in demographic modeling studies. I would be interested in bringing together ecologists, evolutionary biologists, modelers, and oceanographers to create spatially-explicit population genetic models that constrain the presence of species based on reconstructions of environmental conditions and/or fossil records.
I would like to bring together working groups spanning Antarctic research fields, including, but not limited to: - Population connectivity research and conservation planning - Blue carbon research initiatives and legal frameworks for progress - Benthic biodiversity synthesis and planning post initiatives such as the Census of Antarctic Marine Life - Gender equity initiatives to maintain the intellectual capacity of ECRs to contribute their knowledge to science and remain in active research.
I would like to see large data sets that can reveal subtle shifts in local distributions, whether changes in vertical stratification in the intertidal or bathymetric shifts in the deep sea. While reports of geographical range extensions and contractions are quite common in the literature, vertical stratification of taxa should also be shifting with climatic change. Ecological studies and fisheries data may be fruitful sources for such data.
I would love to think about the interaction of ecology and evolution, specifically 1) looking at the prevalence of local adaptation in marine ecosystems, 2) how genomic tools can be used to study dispersal, adaptation and population structure in marine systems and 3) how our knowledge on evolution in marine systems will prepare populations against climate change.

I'd be really excited about a meta-analysis comparing spatial patterns of relatedness and variation across different species. Questions that would be exciting to address include: 1) how do estimates of census population size correlate with genetic estimates of effective population size 1a) are their features of the life history of different species that predict deviations from census-based predictions? 2) is Isolation by Distance a good null paradigm in marine systems? 2a) are there species for which it seems more or less good? 2b) how does larval dispersal mode correlate with patterns of isolation by distance? 2c) how does dispersal ability (either measured, or inferred from morphology) predict patterns of isolation by distance 3) [assuming sufficient species sampling] Is there strong macroevolutionary signal of microevolutionary parameters (e.g., diversity, neighborhood size, etc.)? 4) Comparing the above with terrestrial systems.
I'm especially interested in the assessment of connectivity in the seascape and how such information can be used for conservation. I feel that there is a big need for discussion and development regarding how to combine and compare different approached to connectivity (e.g genetic and oceanographic), and to explore and standardise which measure of connectivity are especially meaningful, understandable and communicable for conservation.
I'm interested in the potential for rapid evolution in marine systems and the molecular mechanisms that could be involved. Molecular biologists and physiologists that specialize in both invertebrate and vertebrate marine systems would be an excellent resource.
I'm interested in thinking about to merge studies where we identify adaptive mechanisms and/or potential with predictions for resilience to climate change. There has been some work on this, mainly from a quantitative genetic perspective. But there is a lot of work more focused on population genetic approaches and identifying specific genes and mechanisms that underlie rapid adaptation. I think it is important to think about how to link these mechanisms to predictions. I'd also be interested in thinking about how adaptive genetic variation is maintained and generated and how this may impact future adaptation- can we make predictions given specific life history (or similar) characteristics? Both of these would couple evolutionary biologists with species distribution modeling as well as ecologists who are well versed in species characteristics.
I'm interested in working with fisheries biologists, oceanographers, and molecular ecologists.
I'm mostly interested in marine population genetics and molecular evolution.
Im interested in how species have adapted to past changes in their environment, and how we can use that to predict how they will adapt to future changes. I would be interested in being part of any group that focus on how single or groups of species (i.e., marine mammals or cetaceans) have adapted to environmental change, or a cross disciplinary group of scientists looking at adaptations at ecosystem level.

In general I'd be interested in ideas relating to the scaling of 1) larval dispersal and gene flow, 2) the spatial and temporal scale of environmental variability and predictability, and 3) the timing of life history events (e.g., age at first reproduction, frequency and duration of reproduction, variance in reproductive success). One specific idea could be addressing whether environmental fluctuations in the sea are really less variable and more predictable than on land by analyzing long-term datasets (e.g., temperature, current/wind speed and direction, and calculating components of spatial and temporal variability, predictability, and autocorrelation (e.g., using the R package envPred I co-wrote). Using satellite data would also allow a spatial analysis of temporal patters (are marine environment more spatially auto-correlated?). Collating data on key life history patterns (e.g., dispersal duration, generation time, longevity, and types of parental care, reproductive mode, etc) of comparable marine and terrestrial species would also be an important step to understanding how environmental fluctuations 'filter' through the life history, to get at biologically-relevant fluctuations. Another idea I'm interested in is to combine evolutionary models (e.g., ones that calculate fixation probabilities and Evolutionary Stable Strategies) with numerical biophysical models of coastal currents (e.g., Siegal et al. Santa Barbara model). Current models of evolution that incorporate spatial structure and dispersal are highly simplified and I don't think we have a good understanding of how 'real' variability in structure and dispersal influence evolutionary outcomes, especially in the sea with stochastic and asymmetric currents with net directional transport. Current uses of biophysical models usually stop at estimating connectivity matrices. The kinds of expertise that would be good (though maybe hard to put together!): 1) A computer programmer (e.g., R) with quantitative skills to develop and run complex analyses with big datasets. 2) Enthusiastic graduate students that are willing to collate data from the literature 3) Both marine and terrestrial experts, especially those that are experts on a certain taxon 4) Ocean / atmospheric physicists and numerical modelers with expertise in time series analysis and currents/wind/dispersal models.
Intersection of local genetic adaptation and plasticity; role of transgenerational plasticity in organismal responses to changing seas.
local adaptation in marine and coastal systems; oceanographers, ecologists, evolutionary biologists
match-mismatch, within-generation selection
My interests for synthesis include evolution, ecology, population genetics, and oceanography. It would be nice to have experts of each of these subjects as well as some interdisciplinary experts like myself.
My strengths are in evolutionary biology and population genetics. I am interested in a number of topics that would be relevant including 1) understanding the role of gene expression in response to environmental variation (with environment defined broadly), 2) understanding the role of plasticity and/or local adaptation (and the potential tension between the two) in response to environmental variation 3) the interaction between gene flow and response to environmental stress and 4) identifying the genetic basis of adaptive phenotypic variation
My work has been focused on plasticity (within and across generations). Lately, I've become more interested in variation in extreme/rarer/novel environments. I think a meta-analysis of reaction norms (including variation around the mean at each environment) and how the chosen experimental treatments correspond to the enviroments experienced by the critters could be quite illuminating. That's just an idea, though
Of the topics in the RCN reading list, plasticity and the scales of spatial/temporal variation are most relevant to my work. It seems that a mixture of oceanographers/climate scientists, biophysicists, organismal biologists (physiology/behavior), and experts in (epi)genetic mechanisms would be good to bring into the same room.
Predictive modeling of rapid adaptation, evolutionary response to global change, genomic basis of local adaptation in wild populations
Prevalence of local adaptation on coral reefs, mechanisms of adaptation/selection versus plasticity contributing to tolerance/resilience to environmental change.
Selection by marine diseases, novel host-pathogen interactions due to climate change, the microbiome as a source of plasticity in the changing ocean. Experts in population genomics, plasticity, pathogen evolution.

The RCN will provide an opportunity to synthesize concepts and questions relating to eco-evolutionary and cellular limits/drivers of rapid adaptation. Building a framework with which to investigate the potential of species or populations to rapidly adapt to environmental change requires a multifaceted understanding of (i) population genetics and population ecology, (ii) processes of plasticity relating to evolution (e.g. transgenerational plasticity and plasticity-first evolution), (iii) epigenetics, and (iv) environmental physiology. Thus, forming a working group composed of researchers with expertise in these fields is a necessary step toward attaining such a framework. Including phylogeneticists specializing in resolving speciation at short timescales (e.g. adaptive radiations) could also provide unique insight here and offer new bridges for cross-disciplinary collaboration.
The recent paper, Chan et al. (2018) states in the Abstract referring to understanding altered larval dispersal under climate change: "Measuring organismal responses to environmentally relevant climate change stress demands an improved documentation of the physical and biological conditions that larvae experience through ontogeny, which in turn requires updated empirical and theoretical approaches. While there are meaningful between taxa comparisons to be made by larval ecologists, to peek into the dispersal black box and to investigate the larger scale consequences of altered dispersal requires innovative collaborations between ecologists, oceanographers, molecular biologists, statisticians, and mathematicians.". I think this would be a good place to start.
The role of adaptation in phenotypic plasticity and understanding the limits of physiological flexibility.
Two areas where we have been investing our research is the role of microbial symbionts in facilitating (or limiting) the response of marine invertebrates to environmental change and using 'omics approaches to identify mechanisms for acclimation and adaptation of marine species to temperature change. Our goal is understand how genomic adaptation and symbiotic relationships may be facilitators of resilience in coastal ecosystems.
We have to incorporate mating systems into our study of marine evolution ecology much as analyzing mating system variation is at the very core of our understanding of population dynamics in terrestrial plants. Likewise, we have to appreciate the diversity of complex life cycles when we think about marine systems and evolution in these systems. Yet, we tend to focus on diploid-dominant species, with studies of haploid or haplodiplontic species being far fewer. Even less work has addressed both the free-living stages in haplodiplontic life cycles. Bringing together terrestrial and marine population geneticists would be a way to address some of these questions and build a working group that could deliver some best practices and tools with which to study these organisms in near-shore marine communities.
While there have been several recent reviews on genetic assimilation/genetic accommodation, and specific studies in marine systems consistent with accommodation/assimilation, I am unaware of a specific comparison between terrestrial and marine systems, or of a synthetic review in marine systems.