22nd Annual Biology Graduate Student Symposium

Program and Abstracts

Oregon State University

Mark O. Hatfield Marine Science Center

Newport, Oregon

February 7th, 2009

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Message from the 2009 Organizing Committee

Welcome to the 22nd Annual Biology Graduate Student Symposium! This conference, organized by and for graduate students, brings together students from all the life science departments at Oregon State University. It is a forum to share research with our peers and to facilitate a better appreciation of the breadth of biological investigation that occurs at our university. This gathering is an opportunity to broaden our outlook on the study of biology; to discuss graduate life and current events; and encourage interactions between future researchers in the various life sciences. We hope you have a productive conference and that you will bring away a positive experience to share with other students.

2009 Organizing Committee:

Julia Buck (Blaustein Lab)
Sarah Close (Lubmenge Lab)
Stephanie Gervasi (Blaustein Lab)
Erin Gorsich (Jolles Lab)
Alison Iles (Lubmenge Lab)
Orissa Moulton (Hacker Lab)
Ivan Phillipsen (Blouin Lab)
Timothy Pusack (Hixon Lab)
Elyse Vaccaro (Arnold / Houck Lab)

Acknowlegements

We gratefully acknowledge the support of the following:

OSU Department Sponsors:
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Department of Environmental and Molecular Toxicology
Department of Fisheries and Wildlife
Department of Zoology

Venue Sponsor:
Hatfield Marine Science Center of Oregon State University

Refreshments and Food Sponsors:
Pattie Aron, Doyenne of Brew, Department of Food Science & Technology
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Fred Meyers of Corvallis

General Information

Presentations: The symposium will take place in the Library Seminar Room (Guin Library) at the Hatfield Marine Science Center (HMSC) (map – p.13). Each talk should be approximately 12 minutes long, followed by 3 minutes for comments and questions. If presenting, please remember that audience members are from diverse fields of biology; please try to make your talk understandable to all. We have computers available to display PC-generated slides from PowerPoint. Please bring a thumb drive or CD with your presentation.

Meals:
BYO utensils and plates but we will have plastic disposables available for those who forgot or don't care. Coffee, tea and treats will be provided at all breaks. Lunch will be at HMSC and dinner will be at the rental house. There will be vegetarian options at all meals.

Saturday Night Dinner/Social: Please join us following the symposium at the rental house. This is a great time to relax and meet everyone. Festivities will begin shortly after the last talk and carry on into the evening. Please feel free to stay overnight. All food and beverages are provided. If you choose to drink something other than soda, beer, or wine please bring it. The rental house is only a few blocks away from Nye beach. Please come and enjoy the food, music and conversation.

Housing/Parking: The rental house is near Nye Beach (directions – p. 14). If you are staying at the rental house, you will need to bring a sleeping bag and bed roll. There are only 2-3 spots in front of the house, but plenty within a couple of blocks.

Schedule of Talks

Time	Presenter	Dept.	Title
9:00	**Registration and Breakfast**		
9:40	**Opening Remarks**		
9:45	Margot Hessing-Lewis	Zoology	Seagrass-macroalgae interactions under a marine-derived nutrient context
10:00	Patricia Wallace	BPP	Biological control and bacterial biofilms
10:15	Elyse Vaccaro	Zoology	Courtship pheromones modulate female receptivity in a plethodontid salamander
10:30	Kaitlin Bonner	Zoology	Evaluating resistance genes in natural populations of *Biomphalaria glabrata*
10:45	**Break**		
11:00	Elizabeth Martin	BPP	Pollen effects on reproductive success in the rare plant *Astragalus peckii*
11:15	Kate Boersma	Zoology	Intraspecies interactions in giant water bug populations in arid headwater streams
11:30	Chris Friesen	Zoology	Female Promiscuity: Why do they do it, and how would we know?
11:45	Rocky Parker	Zoology	Leading two sex lives: associated reproduction in a model dissociated breeder
12:00	**Lunch Break**		
1:00	***Dr. Mark Hixon***	***Zoology***	***Keynote Address: Scientific Advocacy: Oxymoron or Responsibility?***
2:00	**Break**		
2:15	Sean Moore	Zoology	Love in the time of sleeping sickness
2:30	Dave Paoletti	ES	Recognition of an introduced predator by foothill yellow-legged frog tadpoles
2:45	Angela Brandt	Zoology	Can native plants coexist with exotics? Implications of spatio-temporal patterns in California grasslands
3:00	Peter Gaube	COAS	Preliminary observations of ocean color variability associated with mesoscale eddies in the southern Indian ocean
3:15	**Break**		
3:30	Phoebe Zarnetske	Zoology	Coastal dune building capabilities of native and exotic beach grasses: Results from a moveable bed wind tunnel experiment
3:45	Megan Cook	F & W	Research proposal: Is larval bullfrog development a phenotypically plastic response?
4:00	Karen Tonsfeldt	Zoology	It begins with a 'kiss': Estrogen modulates temporal patterns of kisspeptin receptor expression in GnRH neurons to stimulate ovulation
4:15	Joe Tyburczy	Zoology	The influence of contrasting topography on oceanographic processes, larval delivery and settlement in central Chile (Bay of Cartagena)
4:30	**Concluding Remarks**		
5:00	**Proceed to Rental House**		

Keynote Speaker

Dr. Mark Hixon
Keynote Address: Scientific Advocacy: Oxymoron or Responsibility?

Mark Hixon has been a professor in OSU's Department of Zoology since 1984. His expertise is the ecology of coastal marine fishes in both temperate and tropical regions, emphasizing undersea observations and experiments. He completed his Ph.D. at U.C. Santa Barbara, where he studied the ecology of kelp-forest fishes, and was an NSF Postdoctoral Fellow at the University of Hawai`i, where began his studies of coral-reef fishes. Off Oregon, Mark has participated in long-term manned submersible studies of groundfish communities inhabiting the outer continental shelf. He has also published on projects in the U.S. Virgin Islands, the Bahamas, the Great Barrier Reef, and French Polynesia. His research has clarified mechanisms that naturally regulate populations and sustain biodiversity of marine fishes. In 2004, he was honored by ISI Citation Index as the most cited American author on coral reefs in the past decade. A Fulbright Senior Scholar and Aldo Leopold Leadership Program Fellow, Mark serves on the editorial boards of three scientific journals: Coral Reefs, Ecology, and Ecological Monographs. He was an executive appointee of both the Clinton and Bush administrations to the Marine Protected Areas Federal Advisory Committee, which he currently chairs. Mark has also served on the National Science Foundation Geosciences Advisory Committee as chair of the ocean science subcommittee.

Symposium Abstracts *(In alphabetical order)*

KATE BOERSMA *(Zoology)*

Intraspecies interactions in giant water bug populations in arid headwater streams

The intermediate disturbance hypothesis predicts that abiotic processes are more important than biotic processes at structuring natural communities in frequently disturbed systems, such as high relief drought-prone desert streams. However, there is evidence that populations of the giant water bug, *Abedus herberti*, in the intermittent streams of southeastern Arizona are subject to intense biotic interactions throughout the dry season as their prey base dwindles and cannibalism becomes prevalent. I present results of a study on intraspecies interactions in drying stream pools and experimental tanks. Isolated juveniles preferentially distributed themselves at the air-water interface at the edges of experimental pools, however this preference disappeared when more than one bug was present, suggesting strong effects of the presence of conspecifics, possibly resulting from cannibalism. Field studies confirmed a relationship between bug distribution and depth. Adults were found in pools with high surface areas and maximum depths, while juveniles were more evenly distributed throughout the reach. The selection of shallow, peripheral habitats by juveniles and deep, perennial habitats by adults suggests that an ontogenetic niche shift must occur, but the details of this transition remain unknown. As anthropogenic water use in arid lands increases, it is important to determine organism responses to intermittent streams during the drying season in order to create effective conservation plans for these ecosystems.

KAITLIN BONNER *(Zoology)*

Evaluating resistance genes in natural populations of *Biomphalaria glabrata*

Often research in host-parasite systems begins with investigating and evaluating populations in a controlled laboratory setting. Studies validating the consistency of information derived from laboratory strains compared with natural populations are of great importance to ensure accurate representation of natural phenomena, such as disease resistance. *Biomphalaria glabrata* is the intermediate host of *Schistosoma mansoni*, a species of trematode that causes schistosomiasis. Schistosomiasis related deaths in the tropics average 300,000 per year. Two candidate loci, superoxide dismutase (SOD) and peroxiredoxin 4 (Prx4), have been identified in the *B. glabrata* laboratory strain 1316R to play role in determining the level of resistance to *S. mansoni* infection. Both SOD and Prx4 are genes involved in the reactive oxygen species pathway, and are important in innate immune response. The history of the laboratory strain 1316R is poorly known, and is thought to be a hybrid of a few natural populations. Therefore, the geographic origin of specific genotypes conferring resistance is unknown. The goal of this study was to evaluate genotypes of natural populations of *B. glabrata* for SOD and Prx4 to linage trace genotypes in the 1316R laboratory strain to a likely geographic origin, to confirm existence of resistance genotypes in natural populations. Additionally, this study aimed to look for evidence of balancing selection maintaining divergent alleles within populations, a pattern often observed in immune related genes.

ANGELA BRANDT *(Zoology)*

Can native plants coexist with exotics? Implications of spatio-temporal patterns in California grasslands

Environmental heterogeneity can promote species diversity by allowing a greater variety of coexistence mechanisms to operate than in a homogeneous environment. This implies that heterogeneous habitats may be more invasible by exotic species, but also that native species in such habitats may be more likely to coexist with invaders. Quantifying community patterns in time and space provides a first step to understanding how invasion and coexistence processes are operating in an invaded ecosystem, and thus to predicting whether native species may persist without management action. We examined plant community patterns for 5 years at three reserves spanning 500 km in the invaded California grasslands to compare native and exotic plant abundance and diversity over time and space. We found that time explained more variability in native and exotic responses than space at any of the three scales examined, thus both temporal and spatial heterogeneity must be considered simultaneously to understand community dynamics. Furthermore, our results suggest that abiotic conditions, rather than competition, are the primary drivers of patterns of native and exotic abundance and diversity. Native species as a group thus appear to be coexisting with exotics in this system, however further analysis of long-term dynamics and species responses to specific abiotic variables is necessary to better understand these community dynamics.

MEGAN COOK *(Fisheries and Wildlife)*

Research Proposal: Is larval bullfrog development a phenotypically plastic response?

The American bullfrog (*Rana catesbeiana*) has successfully invaded most of the western United States, negatively impacting native pond-breeding amphibians through competition and predation. In order to develop effective management techniques, we need to know whether *R. catesbeiana*'s successful invasions are due to phenotypic plasticity or local adaptation to novel environments. I will conduct a mesocosm experiment, field manipulations, and survey the southern Willamette Valley of Oregon to test the hypothesis that phenotypic plasticity determines larval *R. catesbeiana* development rate. I will quantify larval *R. catesbeiana* development rates in a common garden mesocosm setting using both ephemeral and permanent populations and three hydroperiod treatments. In addition, I will measure larval development rates in field populations in response to managed hydroperiods. Field work will be done in collaboration with national wildlife refuges in the southern Willamette Valley. Understanding the mechanisms behind larval development in *R. catesbeiana* is crucial to managing this invasive species in the Pacific Northwest.

CHRIS FRIESEN *(Zoology)*

Female Promiscuity: Why do they do it, and how would we know?

There are many ultimate and proximate explanations for why females mate multiply; the difficulty is discerning among them. I will present evidence that female red-sided garter snakes mate multiply and discuss the ways I hope to test both ultimate and proximate mechanisms in my future research.

PETER GAUBE *(College of Ocean and Atmospheric Sciences)*

Preliminary observations of ocean color variability associated with mesoscale eddies in the southern Indian Ocean

Mesoscale eddies can affect biological communities through the advection of water parcels from nutrient replete regions into oligotrophic areas, through the shoaling of isopycnals, and by eddy driven upwelling at the sub-mesoscale. These physical processes influence the abiotic environment to which organisms in the upper ocean are exposed. Recently developed eddy tracking techniques are employed to investigate the variability in moderate resolution (4 km) chlorophyll-a concentration observations made by the MODIS and SeaWiFS sensors in a Lagrangian frame of reference, translating with the eddies. The region of interest is the Southern Indian Ocean off the Western coast of Australia. This region has low cloud cover which allows surface chlorophyll-a observations to be made by spaceborne sensors. Eddies originating in the Leeuwin current are observed propagating to the west, transporting nutrient rich coastal water into the Southern Indian Ocean. This study aims to identify the specific properties of these eddies that contribute to the mesoscale variability of ocean color observations.

MARGOT HESSING-LEWIS *(Zoology)*, Sally Hacker *(Zoology)*, Bruce Menge *(Zoology)*, Steve Rumrill *(South Slough National Estuarine Research Reserve, USA)*

Seagrass-macroalgae interactions under a marine-derived nutrient context

In estuaries worldwide, macroalgae blooms have been found to negatively affect seagrass populations. Seasonal monitoring of eelgrass (*Zostera marina*) and ulvoid macroalgae biomass show that biomass of both producers in Coos Bay, Oregon is similar to other estuaries negatively affected by eutrophication. However, interaction strengths measured via a macroalgae addition/removal experiment conducted in Coos Bay do not show consistently negative results. Instead, interaction strength was found to vary as a function of season and location along an upwelling-influenced estuarine nutrient gradient. These initial results suggest that eelgrass in upwelling-influence estuaries may not be negatively affected by naturally occurring blooms of ulvoid macroalgae. In contrast to field-based experiments, the potential for negative interactions was documented in a mesocosm macroalgae addition experiment. In the tank environment, macroalgae additions led to decreased eelgrass survivorship and changes in sediment chemistry. Differences between field and mesocosm experiments are most likely the result of physical differences between experimental venues. Continued research is necessary in order to assess eelgrass and macroalgae parameters as indicators of estuarine health in upwelling-influenced estuaries. Furthermore, research showing linkages between nearshore oceanography and the dynamics of estuarine communities is important for ecosystem-based coastal management initiatives.

ELIZABETH MARTIN (*Botany and Plant Pathology)*

Pollen effects on reproductive success in the rare plant *Astragalus peckii*

Astragalus peckii, a rare species endemic to Deschutes and Klamath Counties in central Oregon, has consistently low seed set. Both pollen quality and pollen quantity can contribute to low reproductive output, and this study tests for the effect of both in field experiments. Reproductive output was measured after controlled crosses using self- and cross-pollen (test for pollen quality) and after pollen supplementation with cross-pollen (test for pollen quantity). Longer-term effects of pollen quality on plant growth and reproduction are also being studied using greenhouse-grown plants. Self-pollinated plants had lower reproductive output in the field compared to cross-pollinated plants, but pollen limitation was only evident at one field site during one of the three years of data collection. When data on reproductive output from this site is compared to pollinator visitation data, there was both a lower rate of pollinator visitation and fewer species of pollinators present that year. However, general trends between pollinator activity and plant reproduction are hard to discern. Preliminary results from the greenhouse inbreeding depression study show slightly lower germination rates and smaller plant stature in plants from self-fertilized seeds. Overall results from this study indicate that pollen quality is of greater concern that pollen quantity for reproductive success of this species. From a conservation standpoint, this would be of greatest concern in small, shrinking, or increasingly isolated populations.

SEAN MOORE *(Zoology)*

Love in the time of sleeping sickness

An estimated 70,000 cases of Human African Trypanosomiasis, commonly known as sleeping sickness, occur each year, and 60 million people are currently estimated to be at risk of infection in sub-Saharan Africa. Caused by the parasitic protozoan *Trypanosoma brucei*, the disease is transmitted between humans and animals by tsetse flies. Because the distribution of tsetse flies in Africa is strongly correlated with temperature and other climatic variables, trypanosomiasis was recently identified as one of the twelve wildlife or zoonotic diseases most likely to spread due to predicted climate changes during the 21st century. To examine the potential impacts of projected warming on trypanosomiasis epidemiology we constructed a model of disease transmission dynamics that incorporates the effect of temperature on tsetse feeding, mortality, and the parasite's incubation period. The model predicts the temperature range over which HAT epidemics are capable of occurring, and successfully identifies the range of climatic conditions in areas where HAT has historically been, or currently is, present. The model does a better job of predicting disease absence than presence due to the existence of other factors such as human population density or disease control efforts that can limit disease transmission even when suitable climatic conditions exist. While certain regions where the disease is currently endemic will likely become too warm for the continued persistence of tsetse flies, and therefore trypanosomiasis, we predict that several regions in Southern Africa where tsetse flies are currently absent will likely become suitable climatically for HAT epidemics by the end of this century. In addition, in a significant portion of Central and West Africa where trypanosomiasis cases only occur sporadically, warmer temperatures may lead to more frequent disease outbreaks.

DAVE PAOLETTI *(Environmental Sciences)*

Recognition of an Introduced Predator by Foothill Yellow-legged Frog Tadpoles

The consequences of species introductions into non-native habitats are a major cause of concern in the U.S. Of particular interest are the effects of introduced fishes on native amphibian communities. In Oregon, the Foothill yellow-legged frog (*Rana boylii*) has disappeared from more than half of its historical range and is now listed as a Sensitive Species. These declines may be attributed to the recent introduction of smallmouth bass (*Micropterus dolomieu*) - a voracious predator. Although smallmouth bass have been implicated, we actually know very little about the interactions between these two species. I sought to determine whether tadpoles could recognize introduced bass as a predatory threat. Through a series of experiments, I examined the behavioral responses of tadpoles to a variety of stimuli (e. g., native predator, introduced predator, control, etc.). Each experiment focused on a different mode of detection: 1) through chemical cues only; 2) visual cues only; or 3) a combination of chemical/visual/mechanical (i.e., water movement) cues. By establishing tadpole detection capabilities, we may begin to elucidate the impacts of smallmouth bass on foothill yellow-legged frogs.

ROCKY PARKER *(Zoology)*

Leading two sex lives: associated reproduction in a model dissociated breeder

Red-sided garter snakes serve as one of the only vertebrate species to exhibit a reproductive pattern called dissociated breeding. In almost all vertebrates, sex steroid hormone levels (e.g. testosterone, estrogen), sexual behavior (e.g. courtship, receptivity) and gametogenesis are all maximal at the same time of year, and this reproductive pattern has been termed associated reproduction. However, some species exhibit a dissociated pattern, where one of the three components of reproduction does not maximally occur in synchrony with the other(s). In the spring of every year, red-sided garter snakes emerge in the tens of thousands from limestone hibernacula in the Interlake Region of Manitoba, Canada, and engage in robust, unequivocal reproductive behavior as males scramble to find, court, and copulate with singly emerging females. Both males and females have very low sex hormone levels at this time, and neither sex is undergoing gametogenesis, yet sexual behavior is at its peak. Recent work that Chris Friesen and I have done has demonstrated that this species is capable of exhibiting an associated pattern of reproduction during the late summer while individuals are still foraging at the large ponds scattered across the Interlake Region. We have been able to sample individuals engaged in several different stages of the annual cycle simultaneously, and have found that males will court females in the field during the summer, but only if they have high testosterone. Once en route back to the den, males have lower levels of testosterone, suggesting this drop in testosterone may mediate the switch from summer activity to migration back to the hibernaculum. It appears that male red-sided garter snakes live two sex lives: an associated pattern in the summer while they're jacked up on T and a dissociated pattern in the spring that may ultimately be the result of hormone synthesis the preceding summer.

KAREN TONSFELDT *(Zoology)*

It begins with a 'kiss': Estrogen modulates temporal patterns of kisspeptin receptor expression in GnRH neurons to stimulate ovulation

Mammalian ovulation requires surges of gonadotropin-releasing hormone (GnRH), released from specialized neurons in the hypothalamus. This surge regulation is mediated by ovarian estrogen (E2) feedback; E2 acts as a negative feedback signal until just prior to the surge, at which point it stimulates more GnRH release. In rodents, GnRH surges are always temporally confined to the late afternoon. Kisspeptin (Kiss1), first identified for its anti-metastatic properties, has since been revealed as an essential part of the reproductive axis by stimulating GnRH secretion by acting through its receptor, GPR54. Kisspeptinergic neurons synthesize more of this peptide in response to E2 and make synaptic contacts with GnRH neurons, making Kiss1 a prime candidate as a GnRH surge-generating signal. However, it is unclear if simple tonic increases in Kiss1 release are sufficient to initiate the surge, or if increases in sensitivity to the signal are required. Kisspeptin administration alone does not stimulate GnRH neurons to surge levels. Using microarrays, real-time qRT-PCR and western blotting, we have found that the levels of GPR54 in cultured GnRH neuronal cell line are regulated by the circadian clock, but only in the presence of elevated E2, such that receptor expression may robustly increase in GnRH neurons just prior to the surge. We have observed high-amplitude patterns of GPR54 expression oscillating with a circadian period only during surge-level estrogen treatment, lending credence to the hypothesis that dynamic changes in patters of GPR54 expression are responsible in part for the GnRH surge generation in response to estrogen positive feedback.

JOE TYBURCZY *(Zoology),* Ruth Milston-Clements *(Zoology)*, Fabian Tapia (*Universidad de Concepción, Chile)*, Sarah Dudas *(Zoology)*, Sergio Navarette *(Pontificia Universidad Católica de Chile)*

The influence of contrasting topography on oceanographic processes, larval delivery and settlement in central Chile (Bay of Cartagena)

Preliminary results from a one-month study in the austral summer of 2008 will be discussed. At two areas with contrasting topography (a bay and a minor headland) daily onshore settlement and delivery of barnacles and mussels was monitored while moored offshore instruments recorded oceanographic data. In upwelling regions, like the west coast of Chile and the U.S., headlands cause intensified upwelling of cold water and offshore transport of surface water, while bays cause retention of warmed surface waters. As expected, the settlement of barnacles was much lower at the headland than within the bay. Settlement of chthamalid barnacles appears to correspond to upwelling periods, however, further analysis of samples and data is necessary.

ELYSE VACCARO *(Zoology)*

Modulation of female receptivity by salamander courtship pheromones

Female sexual receptivity is a behavior at the crux of mechanistic and evolutionary perspectives of reproductive behavior. Recent work addressing receptivity has established that plethodontid salamander courtships show a reduced time to insemination when the female has received male pheromone. Pheromones are delivered during courtship when the male repeatedly taps his pheromone-producing chin gland on the female's nares. Pheromones enter the female's nasal cavity and are shunted laterally to the vomeronasal organ (VNO). This VNO-initiated pathway transmits pheromonal information to sites in the brain known in other vertebrates to be involved in endocrine regulation and modulation of sexual behavior. I investigated three candidate mechanisms by which male pheromones may augment female receptivity: 1) by influencing a non-specific state of placidity (or stimulation), 2) by enhancing a central state of sexual motivation, or 3) by affecting specific sensorimotor integration mechanisms in individual sensory modalities. Females treated with pheromone were assayed for enhanced response to visual and olfactory cues (both male- and food-related), as well as differences in heart rate, general locomotor activity, startle response, and foraging activity. Pheromones enhanced female response to sexual (male) olfactory cues and inhibited feeding activity. Female response to pheromone is likely mediated by multiple sensory systems: a diversity of signals is present in pheromone secretions and even the major components of *P. shermani* pheromone encompass multiple isoforms. Investigating the proximate aspects of a signal-response system may provide insights into how the perception of a chemical signal can induce changes in behavior.

PATRICIA WALLACE *(Botany and Plant Pathology)*

Biological Control and Bacterial Biofilms

There is increasing economic and political pressure for the implementation of sustainable practices for management of agro-ecosystems. The use of biocontrol agents to manage plant diseases has been touted as a means of increasing sustainability. However, the efficacy of biocontrol agents is inconsistent due to poor survival and colonization of plant surfaces. We have discovered a superior biocontrol agent, *Burkholderia pyrrocinia*, (FP62) against *Botrytis cinerea* that forms extensive biofilms on plant surfaces. We hypothesize that the ability for biofilm formation is responsible for the consistent disease control associated with applications of FP62. FP62 mutants, deficient in biofilm formation are no longer able to control disease and appear to have similar leaf populations using culturing techniques but different populations when viewed microscopically. We propose to examine the spatial and temporal distribution of the wild-type and mutants using Environmental SEM in order to reduce artifacts created with traditional SEM fixation techniques. The information gained during this investigation will be used to modify application technology to increase the survival and colonization of biocontrol agents on plant surfaces which should increase their efficacy in controlling plant diseases. FP62 is not intended for the market but only as a model to further our understanding of epiphytic colonization on plant surfaces.

PHOEBE ZARNETSKE *(Zoology),* Eric Seabloom *(Zoology),* Peter Ruggiero *(Geosciences),* Sally Hacker *(Zoology),* Jason Killian *(OH Hinsdale Wave Research Lab),* Tim Maddux *(OH Hinsdale Wave Research Lab)*, Dan Cox *(OH Hinsdale Wave Research Lab)*, Wichai Pattanapol *(University of Otago, New Zealand),* Vrushali Bokil *(Mathematics)*

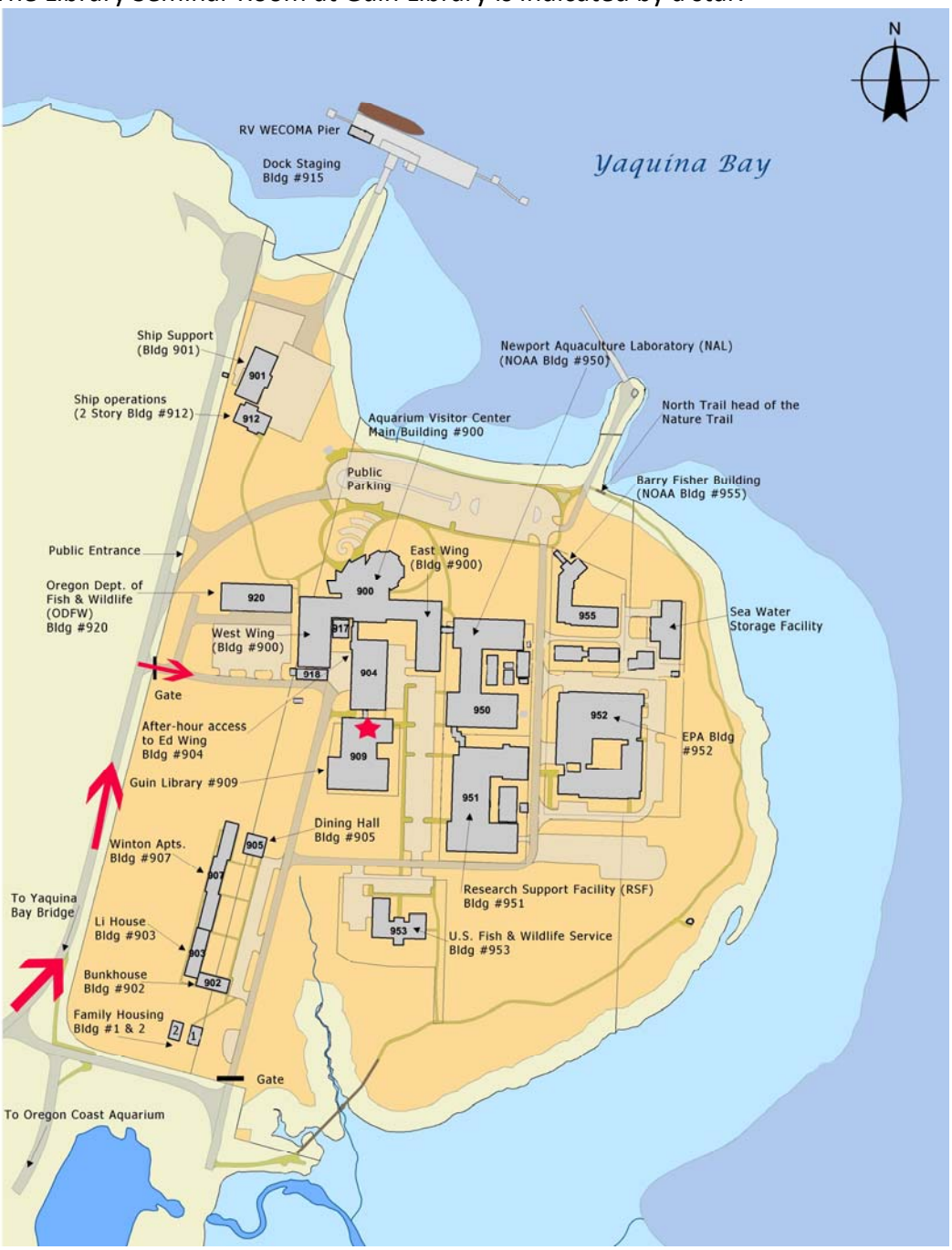
Coastal dune building capabilities of native and exotic beach grasses: Results from a moveable bed wind tunnel experiment

Coastal dune morphology results from the interplay between wind, waves, sediment supply, and vegetation. Over the last 100 years in the U.S. Pacific Northwest, two exotic beach grasses (*Ammophila arenaria* and *A. breviligulata*) have replaced much of the native beach grass (*Elymus mollis*), and formed large continuous, and relatively stable, foredunes where open low-lying dynamic dune systems had previously dominated. Field measurements demonstrate a correlation between dominant beach grass species and foredune height, suggesting the potential for an ecological control on coastal vulnerability. Over a 20 year period, and across a broad range of sediment supply along the coast, *A. breviligulata* is associated with lower foredune heights than *A. arenaria*. Based on these correlations, we hypothesize that the *A. arenaria* is more effective at entrapping and stabilizing sand which results in steep and tall foredune morphology along reaches where this species dominates. A moveable bed wind tunnel experiment is being performed at Oregon State University's O.H. Hinsdale Wave Research Laboratory to test this hypothesis. Our experiments quantify the relative sand trapping capabilities among the three beach grass species across different planting densities and wind speeds. Results from the experiment will help parameterize a computational fluid dynamics model describing dune building capabilities of different species, species' densities, wind speeds, and sediment supplies. Wind tunnel experiments and modeling results will be combined with field data, both biological and physical observations, to inform coastal protection measures and dune ecosystem management.

Map of the Hatfield Marine Science Center

From Corvallis: Take U.S. Highway 20 through Philomath to Newport. In Newport, turn south on U.S. 101. Take the first exit after crossing the Yaquina Bay Bridge and follow the signs to the OSU Hatfield Marine Science Visitor Center parking lot.

The Library Seminar Room at Guin Library is indicated by a star.



Directions to the rental house from HMSC

Exit Hatfield Marine Science Center and turn right onto Highway 101.
Drive 1.9 miles across the Yaquina Bay Bridge and into Newport.
Turn left onto 6th street.
Turn right onto Coast St.
Turn right onto 9th St (unpaved). The house is on the left.

Address: 616 NW 9th St., Newport, OR

Parking: The house only has about three parking spaces in front of it but there is plenty of curbside parking around the block.

Map to rental house from junction of highway 20 and highway 101: