Restoration Notes

Restoration Notes have been a distinguishing feature of *Ecological Restoration* for more than 25 years. This section is geared toward introducing innovative research, tools, technologies, programs, and ideas, as well as providing short-term research results and updates on ongoing efforts. Please direct submissions and inquiries to the editorial staff (ERjournal@aesop.rutgers.edu).

New Ecological Restoration Section at ESA!

Elise S. Gornish (corresponding author: University of California, Davis, One Shields Avenue Mail Stop 1, Davis, CA 95616, egornish@ucdavis.edu) and Kristin B. Hulvey (Utah State University, Wildland Resources Department, NR 206, 5230 Old Main Hill).

Climate and land-use changes are resulting in species loss and rapid shifts in the composition and functioning of ecosystems across the planet (Rockstrom et al. 2009, Cahill et al. 2012). As a result, active restoration is becoming a critical management option to limit the loss of species and ecosystem functions across all bioregions (Heller and Zavaleta 2009). Despite the enormous financial and logistical effort invested in restoration efforts, current approaches often fall short of restoration objectives (Moreno-Mateos et al. 2012). Both the inherent complexity of restoring functional ecosystems and the variability of processes across landscapes limits the development of silver bullet restoration solutions, particularly when coupled with changing climates.

To address these challenges, we co-founded a new restoration section in one of the largest ecological societies in the world—the Ecological Society of America (ESA; www.esa.org/esa). The goals of the new Ecological Restoration section are to promote theoretical and applied research, teaching, communication, grant development, and collaboration on ecological restoration. This is happening through ESA-focused activities, including section sponsored restoration themed symposia, organized oral sessions, and section-hosted mixers at annual meetings. In addition, the section is supporting non ESA-specific activities, including hosting sources of current restoration information (e.g., relevant grants and working group information) to enhance research and collaboration through blog and social media outlets (@ESArestore; www.esa.org/restorationecology).

We chose to start a new restoration section within ESA to create a networking group for scientists who might not be associated with other established restoration groups, such as the Society for Ecological Restoration (SER). ESA members have enormous potential to advance restoration science and practice by exploring restoration concepts within a larger ecological framework. In addition, because restoration activities often encompass multiple areas of ecological investigation—from nutrient cycling, to biotic interactions, to ecosystem functions—a network of researchers within ESA striving to link their traditional field of enquiry with restoration will encourage a synthesis of ecological processes that influence restoration success. This kind of big-picture approach to restoration issues can help focus research on issues that contribute most strongly to restoration solutions—that is on pivotal, 'leverage points'—where small change can lead to large shifts in systems (Hobbs et al. 2011).

Debates about shifting restoration baselines and novel ecosystems have highlighted the human aspects of the restoration discipline (Seastedt et al. 2008, Hobbs et al. 2009). For example, restoring ecosystem functioning or resilience can be more important to managers than returning to a historical baseline—particularly in the face of ongoing large-scale changes that managers have little control to stem such as nitrogen deposition, land-use change, weed spread, or altered climate. The complex social and economic context, within which restoration occurs, however, does not diminish the need for rigorous ecological research to increase restoration success. Ultimately, this new Ecological Restoration Section in ESA will provide a new conduit for cross-disciplinary collaborations that can address today's pressing restoration issues.

The new Ecological Restoration section hosted its first mixer at the 2015 ESA annual meeting. Attendees ranged from graduate students, to restoration managers, to late career faculty. Mixer attendees highlighted several topics that would be of particular interest for the section, including exploring the social context of restoration, identifying practices for large-scale restoration, and understanding the flexibility of ecological systems to accommodate restoration efforts. We are in the process of developing our website and will be sponsoring a section supported symposium for the 2016 ESA meeting in Ft. Lauderdale, FL called: *Social-Ecological Systems in Restoration and Conservation*. The session (#11649) will occur on Monday, August 8 from 1:30–5:00 pm EST. We hope to see you next August at both the symposium and at the Ecological Restoration Section Meeting.

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We encourage anyone interested in restoration ecology to consider joining the section, which is free with ESA membership (www.esa.org/esa/membership-services/).

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Fungal Communities Associated with Sea Oats Seeds Harvested from Sand Beaches and Seed Production Nurseries

Pheonah Nabukalu (corresponding author: School of Plant, Environmental, and Soil Sciences, Louisiana State University Agricultural Center, 104 M.B. Sturgis Hall, Baton Rouge, LA 70803. Current address: The Land Institute, Salina, KS, 67401, nabukalu@landinstitute.org) and Carrie A. Knott (School of Plant, Environmental, and Soil Sciences, Louisiana State University Agricultural Center, 104 M.B. Sturgis Hall, Baton Rouge, LA 70803. Current address: Department of Plant and Soil Sciences, University of Kentucky Research and Education Center. P.O. Box 469, Princeton, KY 42445).

Sea level rise is of great concern worldwide. Along the Gulf of Mexico coast in the United States, many areas, especially in Louisiana, are vulnerable to irreversible economic and cultural losses as sea level rises. The coastal wetlands of south Louisiana, which buffer tropical storms and hurricanes, have been vanishing at a spectacularly swift pace. According to the U.S. Geological Survey (USGS), almost 90 square kilometers of south Louisiana land, mostly marsh, have disappeared each year for the past 50 years; from 1932 to 2000, the state lost almost 5,000 square kilometers of land. In an attempt to protect and restore what wetlands remain, numerous federal, tribal, state, and local agencies are applying extensive efforts such as marsh creation, vegetative plantings, shoreline protection, river diversions, and use of dredged material (LWC 2011). Due to the low cost of installing native plants, relative to man-made structures, and the ecological benefits of native plants, there is increased attention and implementation of planting native perennial vegetation in restoration programs (Maddox and Kelly 2009, USDA-NRCS 2010). Most dune restoration projects along the northern Gulf of Mexico coast install sea oats (*Uniola paniculata*) because it is a native dune plant of the coasts of southern Atlantic and northern Gulf of Mexico of the United States (Wagner 1964, Woodhouse 1978) that tolerates high winds, salt spray, tropical storms and hurricanes, sand burial, low soil nutrients, xeric conditions, and extremely high soil temperatures (Barbour and Johnson 1990) common to coastal dunes.

Most sea oats plants installed in Gulf of Mexico restoration projects are produced from seeds collected from beaches along the Gulf of Mexico. Collecting sea oats seed from beach environments can disrupt natural ecosystems because numerous insect, small mammals such as mice, birds, and crabs rely on sea oats seeds as a part of their diet (Wagner 1964, Ehrenfeld 1990). An alternative would be to produce sea oats seeds outside the coastal zone in seed production nurseries. Sea oats seed can be produced as far north as Baton Rouge, LA (C.A. Knott, University of Kentucky, unpub. data); however, increased pathogen incidence and reduced sea oats seed germination and seedling vigor have been observed for seed produced outside the coastal zone (C.A. Knott, University of Kentucky, unpub. data). Sea oats seed pathogens are known to negatively affect seed germination and seedling survival (Wagner 1964, Hester and Mendelssohn 1987, Ehrenfeld 1990, Burgess et al. 2002, Nabukalu 2013, Nabukalu and Knott 2013). However, to our knowledge sea oats seed pathogens for seeds produced outside the coastal zone have not been identified nor characterized. Identification of seed fungal pathogens can be based on physiological and morphological characteristics, such as the size and shape of macroconidia, presence or absence of microconidia and chlamydospores, and colony morphology. Subtle differences in a single feature can delineate species. Characterization by molecular techniques using polymerase chain reaction (PCR) to amplify the internal transcribed sequences (ITS) allows identification of organisms that cannot be distinguished morphologically (Alves-Santos et al. 1999, Baayen 2000, Haan and Doorn 2000). The objective of the present study was to identify and compare fungal species from sea oats seed produced within coastal zone at sand beaches and outside the coastal zone

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