

Note to EEB faculty: This draft white paper was produced for COALS, in order to get something on biodiversity into their planning for College Signature Areas. This can form the starting point for a white paper from a broader group across campus. We welcome involvement from other faculty, departments and colleges in EEB. If you would like to get involved in preparing a White Paper on Biodiversity Science, please get in touch with us.

**Biodiversity Science: Discovery, Description, Analysis and Application.
A Research Area of Excellence in COALS**

Texas A&M University is poised to become the leading university in the US in the biodiversity sciences, including the inter-related fields of biodiversity discovery, systematics, phylogenetics, population genetics and phylogeography, and organismal and ecological bioinformatics.

World-renowned research, teaching and outreach programs in these areas already exist within several departments in COALS, and prominent scientists in these fields are also located in the Colleges of Science, Veterinary Medicine and Biomedical Sciences, Geosciences and Liberal Arts. The new Interdepartmental Program in Ecology and Evolutionary Biology provides a scientific and intellectual hub for integration of activities in this core subdiscipline of the life sciences – a field that has become essential as the biosphere is increasingly challenged to support human populations and economic activities. There is a critical need for application of biodiversity-related research to solve problems at scales ranging from local to global. As a result, research funding is available from multiple sources, including private, state and federal entities, and opportunities will increase as society faces new challenges in maintaining economic development while protecting our health and the integrity of the ecological systems that sustain us. For example, the multidisciplinary IGERT project in Applied Biodiversity Science, recently funded by NSF at Texas A&M, is integrating biodiversity research and on-the-ground conservation practices in Latin America.

To achieve national prominence in biodiversity science at Texas A&M will require investment in a centralized facility containing state of the art equipment for high-throughput DNA sequencing and analysis; the continued development of biodiversity collections that permanently document geographic, environmental and genetic information by vouchering specimens and tissues; and the integration of diverse kinds of biodiversity information into the world wide web. New faculty positions in phylogenomics, molecular systematics, ecology and biodiversity informatics will provide leadership in these key areas.

The production, organization, analysis and delivery of biodiversity information on very large scales will have enormous impacts on fields as diverse as agriculture, environmental management, medicine, animal health and biosecurity.

Biodiversity sciences provide the primary source of data for global efforts to conserve species, manage renewable natural resources, and predict the effects of climate change on terrestrial and marine ecosystems. Biodiversity sciences contribute to the prediction, detection, and remediation of invasive species that threaten agricultural security, degrade natural resources, and vector new diseases that infect plants, animals, and humans. The costs of preventing, monitoring, and controlling invasive species in the US are huge. For example, the economic impact of invasive plants has been estimated at \$13 billion per year and the annual costs or losses due to the most expensive invasive species can top \$100 million per species. In addition, major, new opportunities exist for engaging students and people of all ages in the study and exploration of biological diversity and its influence on ecosystem dynamics and process, through educational, volunteer, and outreach programs both on-site and electronically using the world wide web.

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