Trawl Sampling on the R/V *Acadiana*

Explore trawling as a scientific research method and the diversity of demersal and pelagic species of Terrebonne Bay by working with data collected by LUMCON over decades.

Grade level	Academic Standards			
	Preformance Expectation	**Sci. & Engineering Practice**	**Disciplinary Core Idea**	**Crosscutting Concept**
K-2				
3-5				
6-8	**MS-LS2-1**. Analyze and interpret data to provide evidence for the effects of resource availability on organisms and populations of organisms in an ecosystem. **MS-LS2-2**. Construct an explanation that predicts patterns of interactions among organisms across multiple ecosystems. **MS-LS2-3**. Develop a model to describe the cycling of matter and flow of energy among living and nonliving parts of an ecosystem. **MS-LS2-4**. Construct an argument supported by empirical evidence that changes to physical or biological components of an ecosystem affect populations. **MS-LS2-5**. Evaluate competing design solutions for maintaining biodiversity and ecosystem services.	Interdependent Relationships in Ecosystems (**LS2.A**) Cycle of Matter and Energy Transfer in Ecosystems (**LS2.B**) Ecosystem Dynamics, Functioning, and Resilience (**LS2.C**) Developing Possible Solutions (**ETS1.B**)	DEVELOPMENT AND USING MODELS • Develop a model to describe phenomena. (**MS-LS2-3**) ANALYSING AND INTERPRETING DATA • Analyze and interpret data to provide evidence for phenomena. (**MS-LS2-1**) CONSTRUCTING EXPLANTIONS AND DESIGNING SOLUTIONS • Construct an explanation that includes qualitative or quantitative relationships between variables that predict phenomena. (**MS-LS2-2**) NGAGING IN ARGUMENT FROM EVIDENCE • Construct an oral and written argument supported by empirical evidence and scientific reasoning to support or refute an explanation or a model for a phenomenon or a solution to a problem. (**MS-LS2-4**) • Evaluate competing design solutions based on jointly developed and agreed-upon design criteria. (**MS-LS2-5**) Connections to Nature of Science SCIENTIFIC KNOWLEDGE IS BESED ON EMPIRICAL EVIDENCE • Science disciplines share common rules of obtaining and evaluating empirical evidence. (**MS-LS2-4**)	PATTERNS Patterns can be used to identify cause and effect relationships. (**MS-LS2-2**) CAUSE AND EFFECT Cause and effect relationships may be used to predict phenomena in natural or designed systems. (**MS-LS2-1**) ENERGY AND MATTER The transfer of energy can be tracked as energy flows through a natural system. (**MS-LS2-3**) STABILITY AND CHANGE Small changes in one part of a system might cause large changes in another part. (**MS-LS2-4**),(**MS-LS2-5**)

Standards for grades 9-12 are on the next page.

Trawl Sampling on the R/V *Acadiana*

Explore trawling as a scientific research method and the diversity of demersal and pelagic species of Terrebonne Bay by working with data collected by LUMCON over decades.

Grade level	Academic Standards			
	Preformance Expectation	**Sci. & Engineering Practice**	**Disciplinary Core Idea**	**Crosscutting Concept**
9-12	**HS-LS2-2** Use mathematical representations to support and revise explanations based on evidence about factors affecting biodiversity and populations in ecosystems of different scales. **HS-LS2-7** Design, evaluate, and refine a solution for reducing the impacts of human activities on the environment and biodiversity. **HS-LS4-6** Create or revise a simulation to test a solution to mitigate adverse impacts of human activity on biodiversity. **HS-ESS3-3** Create a computational simulation to illustrate the relationships among management of natural resources, the sustainability of human populations, and biodiversity.		INTERDEPENDENT RELATIONSHIPS IN ECOSYSTEMS • Ecosystems have carrying capacities, which are limits to the numbers of organisms and populations they can support. These limits result from such factors as the availability of living and nonliving resources and from such challenges such as predation, competition, and disease. Organisms would have the capacity to produce populations of great size were it not for the fact that environments and resources are finite. This fundamental tension affects the abundance (number of individuals) of species in any given ecosystem. (**LS2.A**) ECOSYSTEM DYNAMICS, FUNCTIONING, AND RESILIENCE • A complex set of interactions within an ecosystem can keep its numbers and types of organisms relatively constant over long periods of time under stable conditions. If a modest biological or physical disturbance to an ecosystem occurs, it may return to its more or less original status (i.e., the ecosystem is resilient), as opposed to becoming a very different ecosystem. Extreme fluctuations in conditions or the size of any population, however, can challenge the functioning of ecosystems in terms of resources and habitat availability. (**LS2.C**)	USING MATHEMATICS AND COMPUTATIONAL THINKING Use mathematical representations of phenomena or design solutions to support and revise explanations. CONNECTIONS TO NATURE OF SCIENCE Scientific Knowledge is Open to Revision in Light of New Evidence • Most scientific knowledge is quite durable, but is, in principle, subject to change based on new evidence and/or reinterpretation of existing evidence.