# Environmental Studies Program: Studies Development Plan | FY 2019–2021

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| Title | Creating Environmental Studies Program Information System (ESPIS) Linked Data to Enhance Support of BOEM Business Lines |
| Administered by | National |
| BOEM Contact(s) | Jonathan Blythe, jonathan.blythe@boem.gov |
| Procurement Type(s) | Inter-agency agreement |
| Principal Investigator(s) | Dave Stein (Alexa Ramirez) |
| Conducting Organization(s) | NOAA Office of Coastal Management (contracting w/ Quantum Spatial, Inc.) |
| Approx. Cost | $300 (in thousands) |
| Performance Period | FY 2020–2022 |
| Final Report Due | N/A (Final database deliverable due October 31, 2022) |
| Date Revised | December 30, 2019 |
| PICOC Summary | Write one or two sentences for each of the following elements, as appropriate. |
| Problem | Scientific information is needed across the board for evidence-based decision making, but information is managed very differently across the Bureau. |
| Intervention | Information in ESPIS will be migrated to a new schema based on the World Wide Web Consortium (W3C) PROV model, while also ensuring continuity for geoESPIS search tool requirements. |
| Comparison | ESPIS currently operates like accounting system to keep track of information products delivered from environmental studies.  ESPIS could be a lot more useful if it also tracked how ESPIS information products related to each other, their use in other BOEM information products (like NEPA documents), and how they are used and cited by the broader scientific community. |
| Outcome | Creates ESPIS linked data including a record of provenance of how ESPIS information supports business lines outside ESP. For example, a study may produce data, but another BOEM program uses said study data to create a map visualization that is used in another BOEM product or decision process. |
| Context | Study Development Plan, study profile, study products, ESPIS, Information Technology (IT) |

**BOEM Information Need(s):** ESPIS is a public outreach tool that demonstrates accountability for ESP expenditures by cataloging studies with nested listings of study products. Enhancements to this simple receipt tracking functionality are needed that address the scientific workflow for ESP information. For example, study profiles are critical for defining the requirements for deliverables.  Further, there may be specific tasks that define scientific research activities that, if captured in ESPIS, could enhance accountability for study products. Finally, once we can determine that a study has delivered it's full complement of information products, it may be possible to take accountability further to show the utility of the acquired information.  For example, ESPIS could track and display how study information is used in National Environmental Policy Act (NEPA) documents (i.e. Environmental Impact Statements, Environmental

Assessments), and could provide innovative solutions to provide deep background for NEPA documents.  Citations in the scientific literature could be collected to calculate the citation index for each study and an impact factor for environmental science in ESPIS.

**Background:**  In 2015, ESPIS was modernized from a circa 1995 bibliographic catalog and report retrieval system, to a contemporary geographically enabled search and discovery tool for studies reports, data, and related publications (see [https://marinecadastre.gov/espis/#/](https://marinecadastre.gov/espis/#/)) (Office of Coastal Management, 2018). The new ESPIS, known as geoESPIS, emulates contemporary web based search tools, like Google Search.  This enhancement was developed through a partnership with the National Oceanic & Atmospheric Administration (NOAA) Office of Coastal Management, drawing upon BOEM's and NOAA's shared investments in the MarineCadastre.gov platform. BOEM continues to steward geoESPIS in partnership with NOAA.

The ESPIS enhancements created a logical method of listing study products on study landing pages, and added references to other types of study products such as data products, and related publications that were not supported in the preceding ESPIS report catalog and retrieval system. These enhancements required cataloging of studies using a class of information called business metadata, which, according to the Department of the Interior's Metadata Implementation Guide, is an important construct for enabling discovery of relevant information in catalog systems (Obuch et al. 2018). However, where ESPIS focuses only on the dissemination of study results, more work is needed to show the applicability of ESP information in a variety of settings.

With ESPIS enhancements, BOEM has opened a dialog with stakeholders and the public, by speaking in the language of the modern Internet era.  However, to speak the language of the Internet intelligently, ESPIS has to move beyond a catalog's discovery functionality and be able to also demonstrate how study information has or can be used. For example, the oceanographic community is beginning to support data catalogs of linked data (Ledbetter et al. 2013), which builds upon the W3C Internet standards, such as the PROV model (Missier et al. 2013). These Internet tools can depict sophisticated relationships between information objects, like how PROV supports information presented in the National Climate Assessment with references to scientific papers and datasets (Tilmes et al. 2013).

**Objectives:** The objectives of this study are to:

- Design quality control criteria for listing of data products on landing pages.

- Represent ESP research activities and their relationship to study products.

- Redesign of ESPIS landing pages to summarize study information use.

**Methods:**  Draw upon best practices for data representation and widely adopted Internet standards, such as W3C PROV model, for capturing the relationships between study planning (profiles) and product materials (final reports, data). Provide a logical construct to be able to link to study information that can be coordinated with the timely production of NEPA activities. Produce landing pages that are the targets of links that

allow interested parties to "drill down" and evaluate supporting ESPIS materials. Relationships concepts should be designed generically enough to be able to support any product from across the BOEM business lines. Provide queries for provenance information for systematic program analysis and generate metrics of ESP performance. Design and implement an ESPIS relational database optimized for linked data, but that is backwards compatible with geoESPIS, using relational operators such as join.

**Specific Research Question(s):**

1.  What are the relationships between study products listed in ESPIS?

2.  Which study products need to be maintained by BOEM?

3.  Which study products serve as documentation and have no further use?

4.  How do study products relate to task and sub-task plans for a study?

5.  How are study products used in other BOEM business lines, like NEPA?

**Current Status:** Planning is underway for the ESPIS database redesign, including IT planning processes.

**Publications Completed:** N/A

**Affiliated WWW Sites:** N/A

**References:**

Leadbetter A, Arko R, Chandler C, Shepherd A, Lowry R. 2013. Linked data: an oceanographic perspective. The Journal of Ocean Technology. 8(3)7-12.

Missier P, Belhajjame K, Cheny J. 2013. The W3C PROV family of specifications for modelling. Proceedings of the 16th International Conference on Extending Database Technology. Genoa, Italy. doi:10.1145/2452376.2452478

Obuch R, Carlino J, Zhang L, Blythe J, Dietrich C, Hawkinson C. 2018 Department of the Interior metadata implementation guide—Framework for developing the metadata component for data resource management. USGS Techniques and Methods Report Number TM16-A1. doi: 10.3133/tm16A1

Office of Coastal Management, 2018. Final report for ESPIS (placeholder reference)

Tilmes C, Fox P, MA X, McGuinness DL, Privette AP, Smith A, Waple A, Zednik S, Zheng JG. 2013. Provenance Representation for the National Climate Assessment in the Global Change Information System. IEEE Transactions on Geoscience and Remote Sensing.  51(11)5160-5168. doi: 10.1109/TGRS.2013.2262179