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Consider the travels of the gray whale: summering in the Arctic Ocean and wintering in Baja, Mexico, this marine mammal migrates along the West Coast of North America each year. These coastal travels mean that the gray whale interacts with a wide variety of human activities, including seismic testing by the oil and gas industry in the Arctic, commercial and recreational fishing all along the U.S., Canadian, and Mexican coasts, shipping in and out of some of the world's busiest ports, whale watching, recreational boating, Navy training exercises, and more. These cumulative impacts on the whale could be substantial, but how do we determine their effects? Working with our partners, ELI is mapping out a plan—literally.

The National Environmental Policy Act is designed to help agencies determine whether their actions will significantly

affect environmental quality by requiring an environmental impact statement when significant impacts are expected. In determining whether agency actions such as issuing fishing permits or incidental take authorizations will significantly harm the environment, agencies must evaluate the cumulative effects of past, present, and reasonably foreseeable future activities. A look at past EIS documents makes it clear that such cumulative impact analyses are typically little more than cursory exercises in abstract evaluation of problems the authors have a hard time defining, much less assessing.

In part, the lack of meaningful cumulative impact analyses is acceptable practice because they are extremely difficult. The reasons for this difficulty are many—there is no single source of past, present, or reasonably foreseeable actions; no database of NEPA documents; and no comprehensive approach for cataloging species and habitat impacts.

But significant advances in mapping and information management can overcome these challenges. In 2011, ELI's Ocean Program and a group of NEPA, ocean management, and mapping experts came together to conceptualize a solution—a solution known as Geospatial NEPA. Here, I will lay out the concept in three basic steps.

Step 1: Look back and map existing NEPA documents. Al-

though it may be surprising to hear that there is no single comprehensive NEPA database that includes copies of past environmental assessments and EIS documents, a new database could be designed that explicitly maps the footprint (or at least the location) of every NEPA analysis and includes both a summary of key elements of the document and a link to the actual NEPA document.

Such an approach satisfies two major objectives. First, it allows one to explore and search for NEPA analyses in a spatially explicit way, which would be extremely useful when conducting cumulative impact assessments. Second, it provides an easy-to-use visualization tool, which would enhance public access to information.

Step 2: Look forward and create a NEPA data entry system. The next step in the Geospatial NEPA system is to enable all developers of NEPA documents to add key information into the database. Instead of just providing a map in a PDF document, document developers could upload the GIS coordinates of the footprint of the project.

Step 3: Develop NEPA data layers based on predicted impacts. This is where things get tricky—and could be a game-changer for cumulative impacts analyses. Let's go back to the gray whale example. Although a NEPA analysis may indicate a number of gray whales harassed in a proposed project

area, the area of impact can be much bigger—for the gray whale, the area of impact is actually the entire range of the animal. If the NEPA data entry system were designed to allow prediction of impacts on a species or habitat basis, one could actually start to see and understand the cumulative effects of human activities in any given area. Imagine a gray whale data layer that combines all of the predicted impacts of human activities in a given year, which would provide agencies with a realistic sense of the total number of whales predicted to be harmed. Perhaps this could open the door to a cumulative impact analysis that goes beyond hand waving, and toward quantitative assessment of human impact.

Beyond the utility of this approach in the context of NEPA analysis, the ELI Ocean Program believes that the bonus prize is the potential to take an expensive, lengthy assessment process—which so far has had limited utility beyond the agency action in question—and transform it into a dynamic and useful tool for decisionmakers, stakeholders, and the public.