

ID: W2809217879

TITLE: An ecological framework for informing permitting decisions on scientific activities in protected areas

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ABSTRACT:

There are numerous reasons to conduct scientific research within protected areas, but research activities may also negatively impact organisms and habitats, and thus conflict with a protected area's conservation goals. We developed a quantitative ecological decision-support framework that estimates these potential impacts so managers can weigh costs and benefits of proposed research projects and make informed permitting decisions. The framework generates quantitative estimates of the ecological impacts of the project and the cumulative impacts of the proposed project and all other projects in the protected area, and then compares the estimated cumulative impacts of all projects with policy-based acceptable impact thresholds. We use a series of simplified equations (models) to assess the impacts of proposed research to: a) the population of any targeted species, b) the major ecological assemblages that make up the community, and c) the physical habitat that supports protected area biota. These models consider both targeted and incidental impacts to the ecosystem and include consideration of the vulnerability of targeted species, assemblages, and habitats, based on their recovery time and ecological role. We parameterized the models for a wide variety of potential research activities that regularly occur in the study area using a combination of literature review and expert judgment with a precautionary approach to uncertainty. We also conducted sensitivity analyses to examine the relationships between model input parameters and estimated impacts to understand the dominant drivers of the ecological impact estimates. Although the decision-support framework was designed for and adopted by the California Department of Fish and Wildlife for permitting scientific studies in the state-wide network of marine protected areas (MPAs), the framework can readily be adapted for terrestrial and freshwater protected areas.

SOURCE: PloS one

PDF URL: <https://journals.plos.org/plosone/article/file?id=10.1371/journal.pone.0199126&type=printable>

CITED BY COUNT: 7

PUBLICATION YEAR: 2018

TYPE: article

CONCEPTS: ['Environmental resource management', 'Wildlife', 'Habitat', 'Vulnerability (computing)', 'Variety (cybernetics)', 'Impact assessment', 'Ecology', 'Environmental planning', 'Geography', 'Environmental science', 'Computer science', 'Biology', 'Computer security', 'Public administration', 'Artificial intelligence', 'Political science']