Envisioning a New Database Structure to Improve Compensatory Mitigation Outcomes in Offsetting Impacts to Aquatic Resources

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The Context

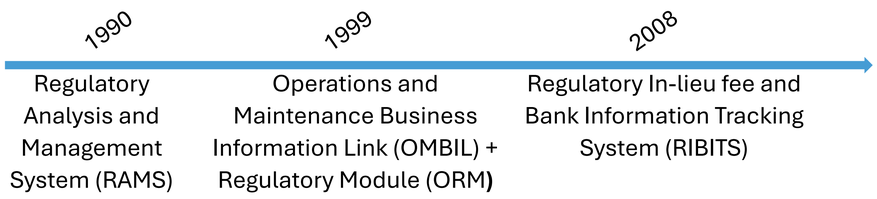
Driven by the 1972 Clean Water Act, compensatory mitigation for wetland and stream impacts has evolved into the largest ecosystem services market in the world. However, connecting wetland and stream impacts with mitigation offsets to evaluate this market has proven challenging.

The Problem

Wetland impacts and mitigation projects (ecological restoration sites) are currently tracked through separate databases that are not linked by a unique identifier. The US Army Corps of Engineers tracks impacts using the OMBIL+ Regulatory Module (ORM), and mitigation projects using the Regulatory In-lieu Fee Banking and Information Tracking System (RIBITS). It is difficult for regulators, researchers, or the public to:

- Link impact and mitigation projects
- Monitor the effectiveness of mitigation in offsetting impacts
- Determine whether mitigation occurs within impacted communities

USACE Database Evolution



Our Database Model

An Entity-Relationship Diagram (ERD) is a database design tool used to visualize connections among separate tables and views within a database system. Here, we show how multiple tables could be structured within a unified database to track wetland and stream impacts and offsets as they are linked using unique transaction identifiers. The database could be queried to quickly find information.

Example query: "How many acres of wetland impacts have been offset by mitigation in a given spatial service area?" The **red line highlights** how the query would traverse the database.

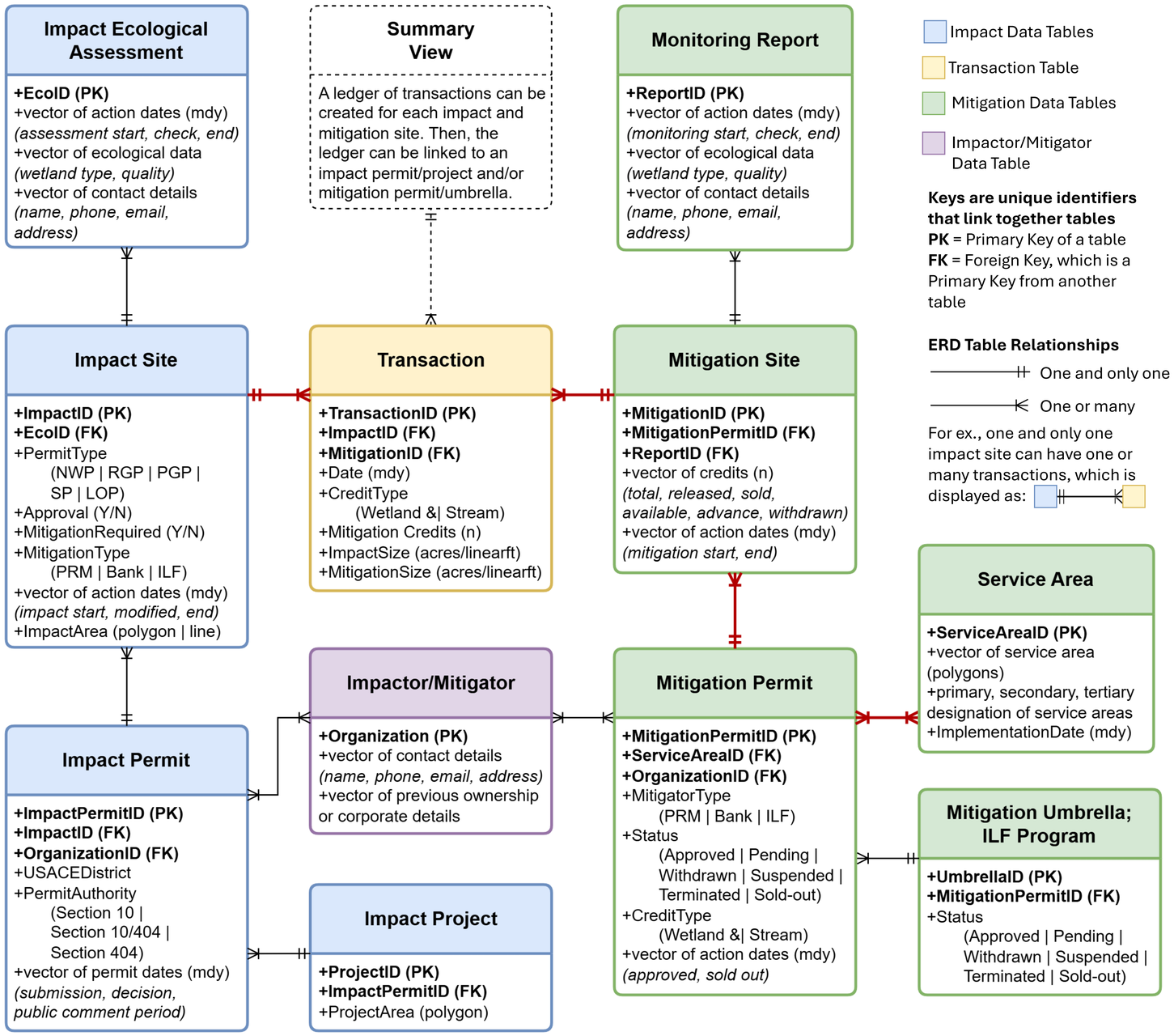


Figure 1: Our proposed database model directly links wetland and stream impacts to compensatory mitigation projects through unique TransactionIDs. This TransactionID represents a purchase (or creation) of mitigation credits to offset hierarchically represented aquatic resource impacts (projects can contain multiple permits, which can contain multiple impact sites) with compensatory mitigation projects (which can contain individual sites and be part of broader mitigation programs).

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