Delaware Estuary Database

Phase 2: Delaware River Study

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USGS science for a changing world

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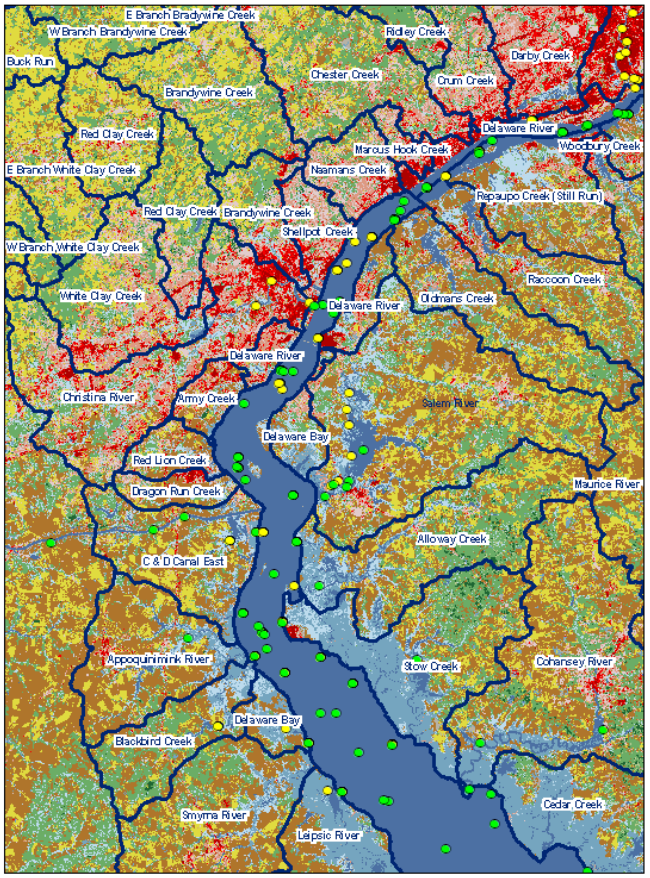
Overview

- Project Objective and Phase 1 Study
- Relative Risk Model (RRM) and Stressor Matrix
- Database Design and QA/QC
- ArcGIS® Model Builder
- ArcGIS® Database Contents

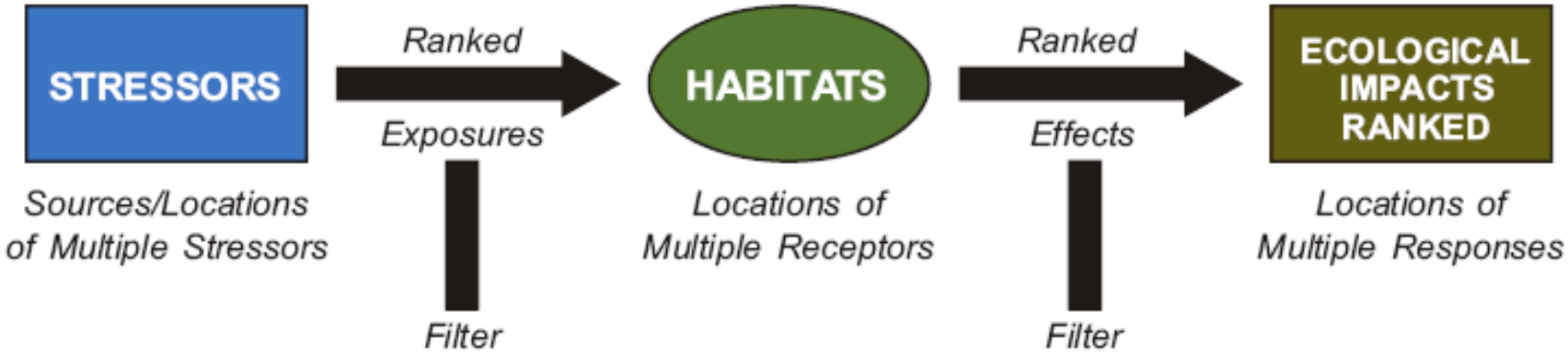
Project Objective

- To develop a searchable, georeferenced database of environmental conditions in the Delaware Estuary as they relate to key stressors identified by the Phase 1 RRM of the Delaware River Study

http://www.fish.state.pa.us/images/be/splashes/2006/se05_12striper54_8.jpg



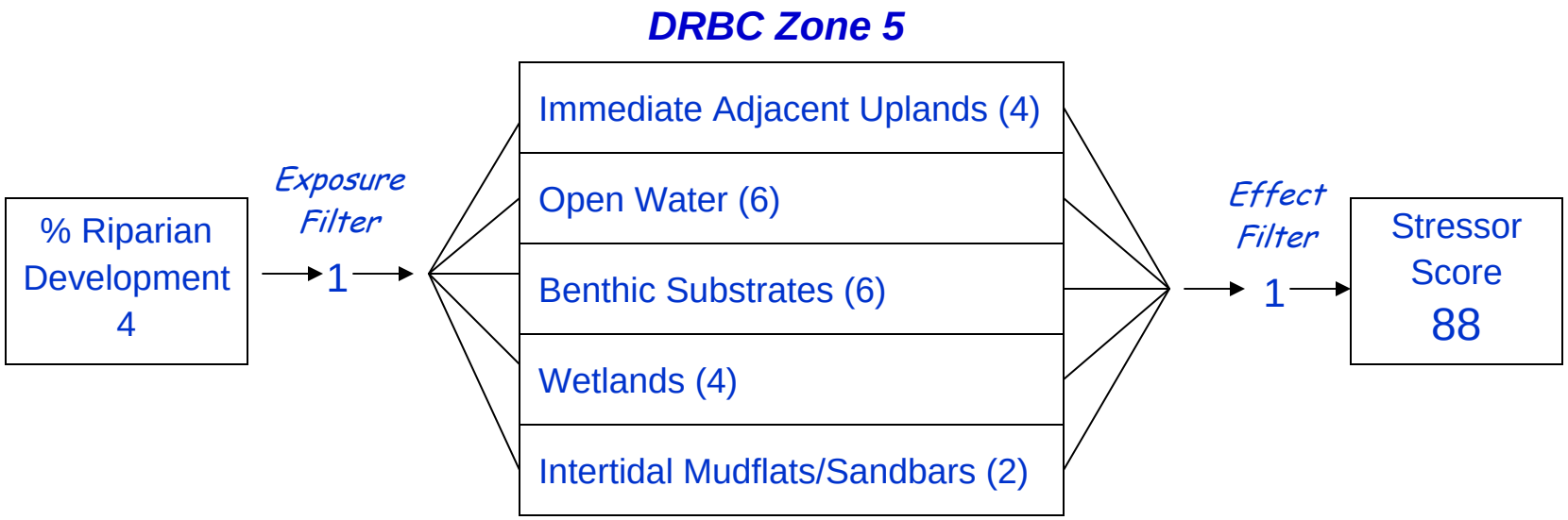
Review of Relative Risk Model



SOURCE:
ADAPTED FROM
LANDIS AND WIEGERS (2005)

Example Computation of RRM

- Physical Stressor: Habitat Loss/Degradation
- Metric Assessed: % Riparian Development



Review of Stressor Matrix

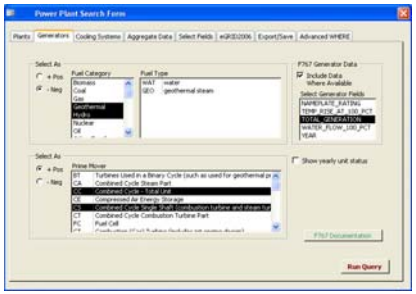
- Directs Database Development Activities
- Summarizes Results of Phase 1 RRM
- Prioritizes Major Stressors by Relative Magnitude and DRBC Zone 5
- Synthesizes Potential Local and Regional Data Gaps
- Identifies Prospective Data Sources for Database Collection

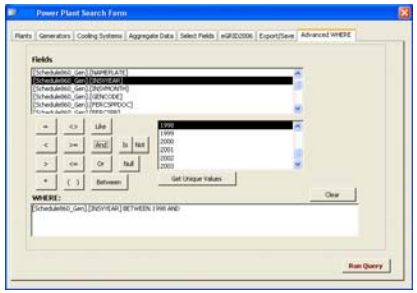
Key Stressors Assessed in Phase 1 RRM

- **Physical**
  - Water Volume
  - Suspended Solids
  - Sedimentation
  - Habitat Loss/Degradation
  - Water Temperature
  - Barriers to Fish Access
  - Salinity Changes
- **Chemical**
  - Dissolved Oxygen
  - Petroleum, PAHs, and Related Chemicals
  - PCBs
  - Metals
  - Nutrients
  - Pesticides
  - Dioxins & Furans
  - Other Chemicals
- **Biological**
  - Reduction of Local Stocks
  - Invasive Species
  - Pathogens (Oyster Disease)

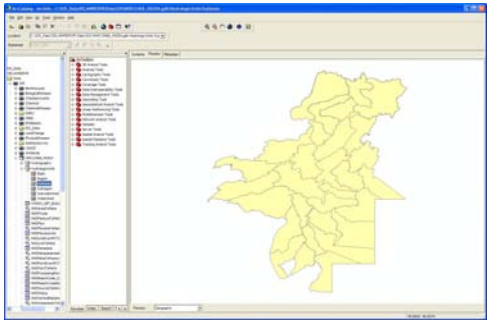
Database Design

- Database Comprised of Two Linked Systems
  - Microsoft Access Physical, Chemical, and Physical Database with “User Friendly” Front End





  - ArcGIS® Spatial Database



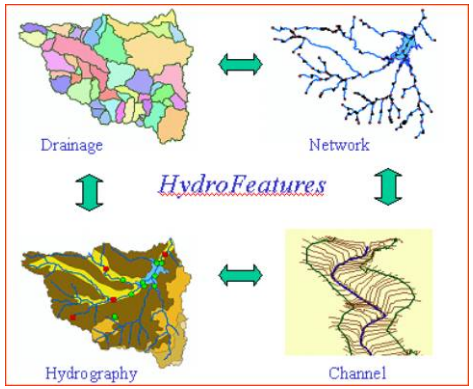
- **Objective:** Merge Query and Analysis Capabilities of Two Systems Using ArcGIS® Model Builder Application to Run RRM

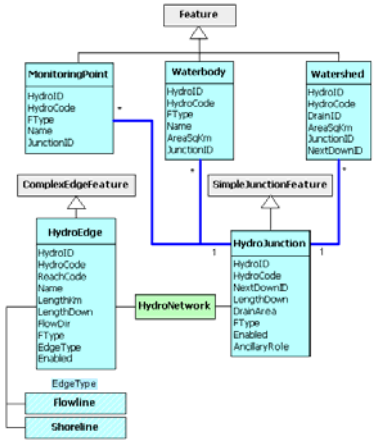
Database QA/QC

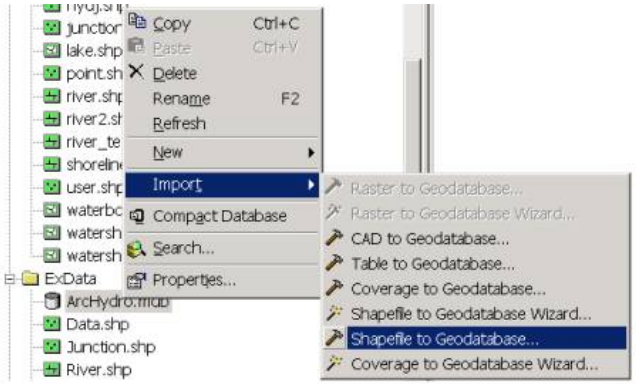
- Database Quality Assurance Critical to RRM Success
- Microsoft Access Database Created from Multiple Sources of Varying Quality
  - Followed Best Practice Database Design with End-Purpose Results in Mind
  - Normalized Database
  - Developed Transcription Scripts to Minimize Upload and Integration of External Dataset Errors
  - Database QA/QC Undertaken with Integrated Use in Mind

Database QA/QC

- ArcGIS Spatial Database Built on ESRI ArcHydro Data Model Modified for Specific Functional Needs of RRM
  - Provide a Practical Template for Implementing GIS Projects with Consistent and Tested Format
  - Selection of Best Quality Data Available - Detailed Review of Available Metadata to Make Determination
  - Keep Uncertainty Analysis Needs in Mind







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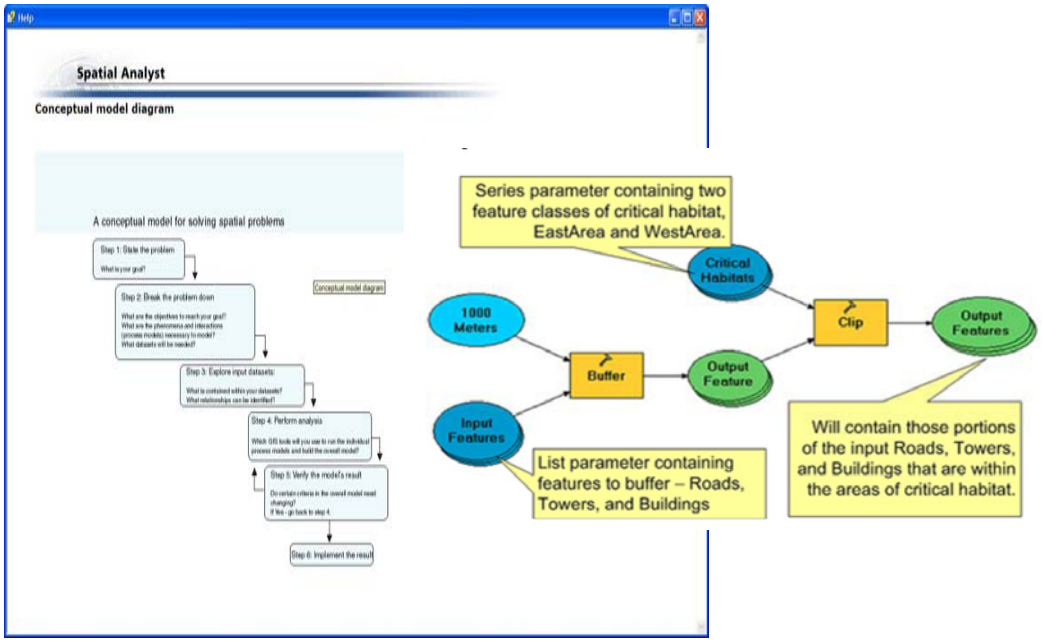
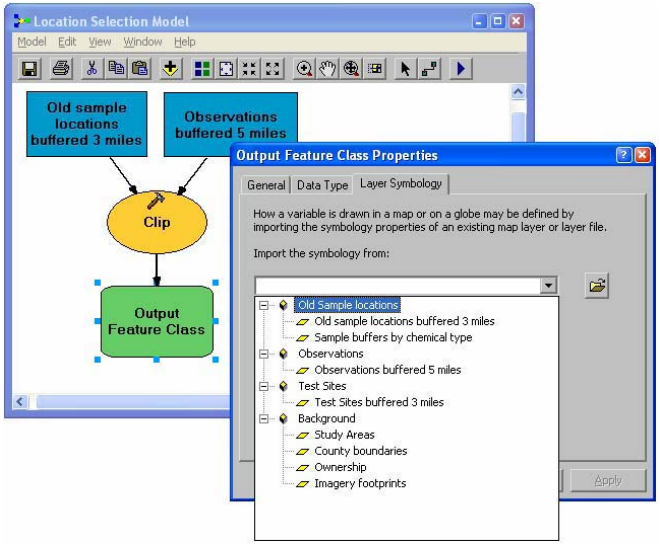
RRM and ArcGIS® Model Builder

- Merged Query and Analysis Capabilities of Both Systems Through the Model Builder Application
- Allows Multiple Runs of the RRM





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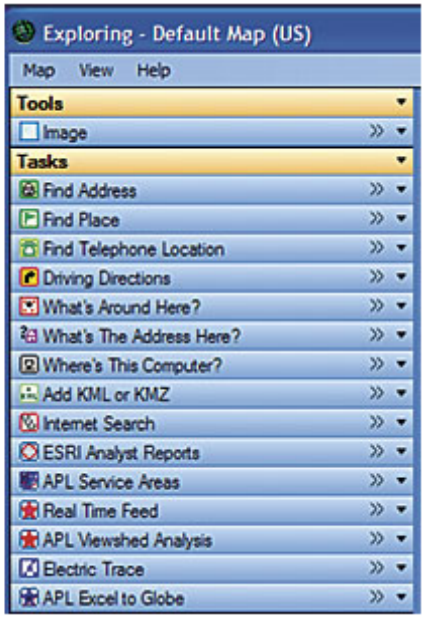
RRM and ArcGIS® Model Builder

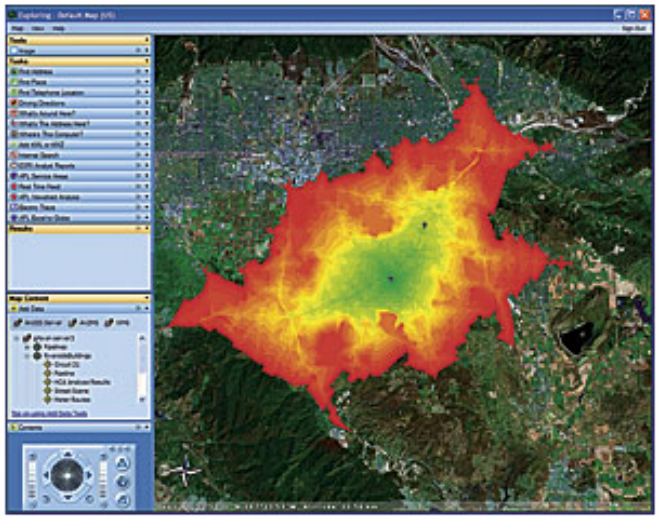
- Other Considerations for Stakeholders
  - Ability to Perform Future Updates of Underlying Information
  - Improve Usability Through Web-Enabled Application

ArcGIS Explorer Tasks



Server-based geoprocessing tasks being accessed from this ArcGIS Explorer globe

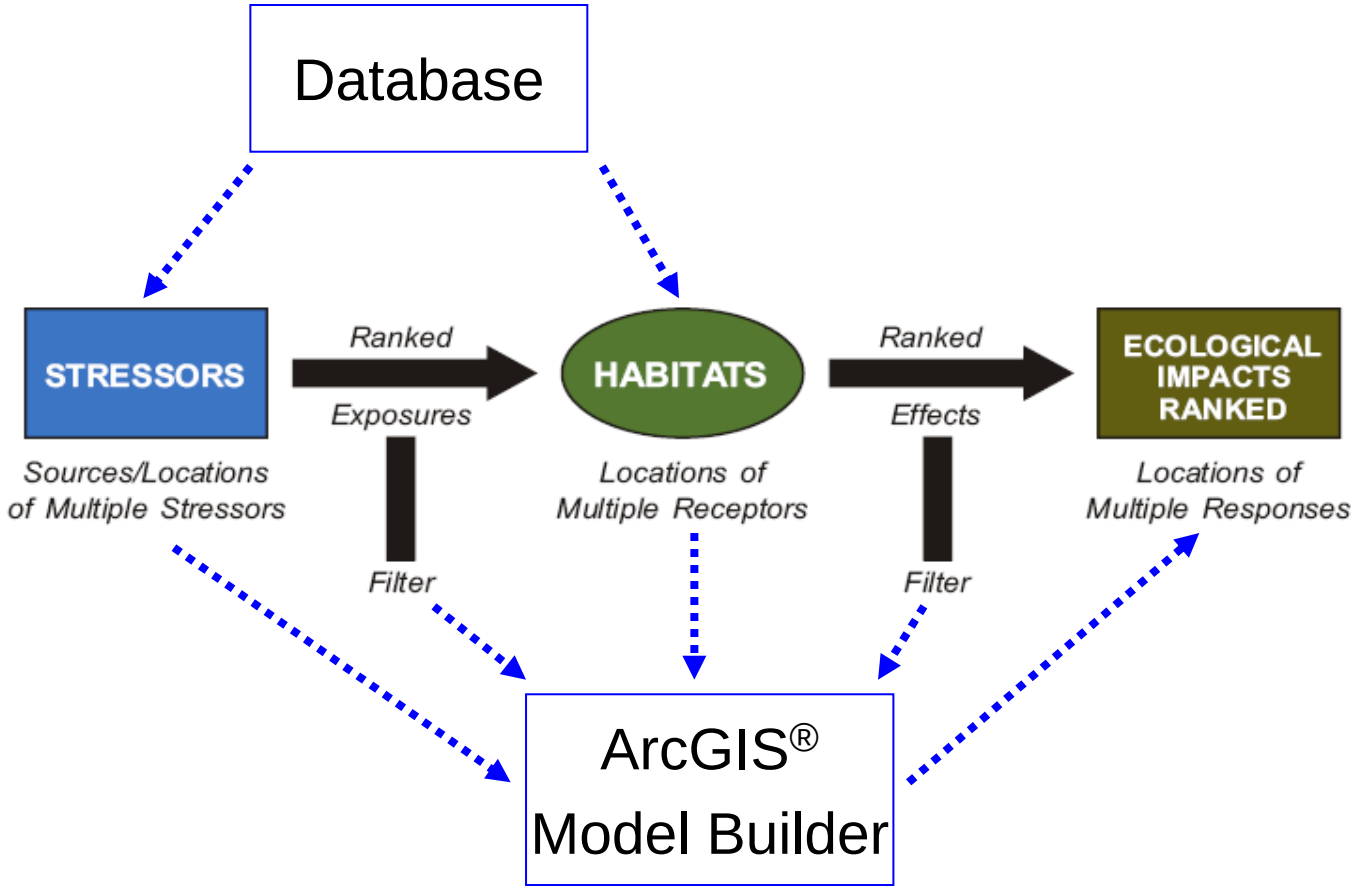
ArcGIS Explorer:



Database Contents *(ArcGIS View)*

- Review of Data Collection Priorities
- Glimpse at Database Contents
  - Physical
    - USGS National Land Cover Dataset 2001
    - DNREC Delaware Bay Benthic Mapping Program
  - Chemical
    - Sediment, Surface Water, and Tissue Observations
    - Mercury in Sediment Observations
  - Biological
    - DNREC Delaware River Striped Bass Spawning Stock Survey
    - NJDEP Delaware River YOY Recruitment Survey

How Does Database Relate to RRM?



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