CRRC-Sponsored Spill Modeling Working Group Evaluation of Modeling Approaches and Information Needs for Developing the Next-Generation Oil Spill Model
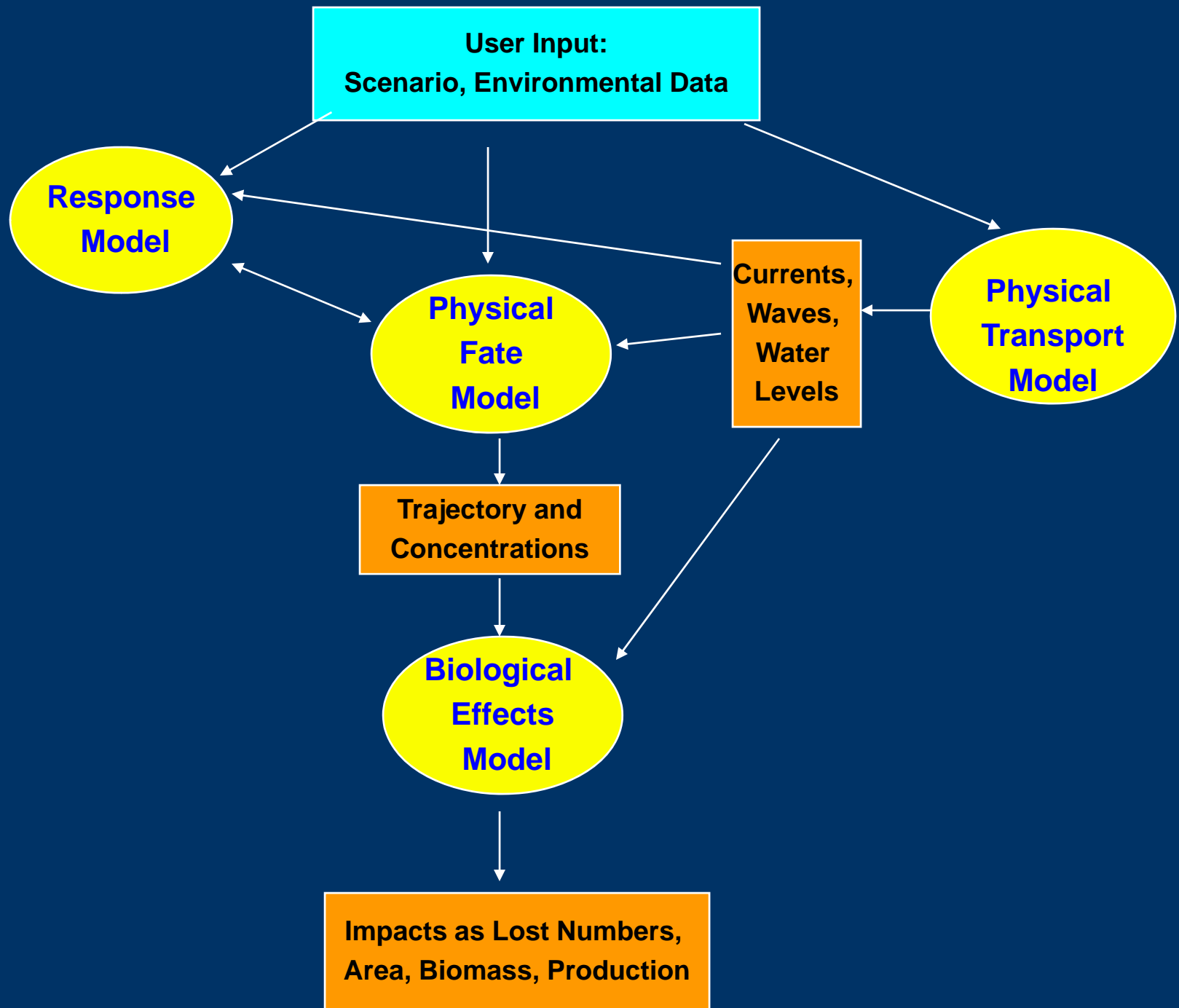
Presented by:

Deborah French McCay, Bill Lehr, CJ Beegle-Krause, and Dagmar Etkin

Objectives

- **Literature review and evaluate modeling approaches**
- **Identify state-of-the-art**
- **Address uncertainty**
- **Identify research needs**
  - **How model algorithms can be improved**
  - **Data requirements for improvement**
- **Not writing code**
- **Conceptual outline of**
  - **Potential algorithms**
  - **Next generation models**

Four Work Groups

| Working Group	Chairs	Presenters and Those Present
Physical Transport	CJ Beegle-Krause (ASA) Michel Boufadel (Temple U)	Jerry Galt (Gen West)
Physical Fate and Behavior	Bill Lehr (NOAA) Mark Reed (SINTEF)	Ali Khelifa (Environment Canada)
Biological Effects	Debbie French McCay (ASA)	
Spill Response	Debbie Payton (NOAA) Wolfgang Konkel (Exxon Mobil)	Dagmar Schmidt-Etkin (ERC) Al Allen (Spilltec)

Sept 2008 Meeting

Physical Transport Modeling

- **Where will the oil go?**
- **Variety of timescales**
    - **Short: Dispersant application**
    - **Long: Persistent oil (long)**
- **Variety of length scales**
    - **Short: Langmuir cells**
    - **Long: Long shore transport of persistent oil**
- **Support subsequent groups**
    - **Physical fate**
    - **Biological effects**
    - **Spill response**
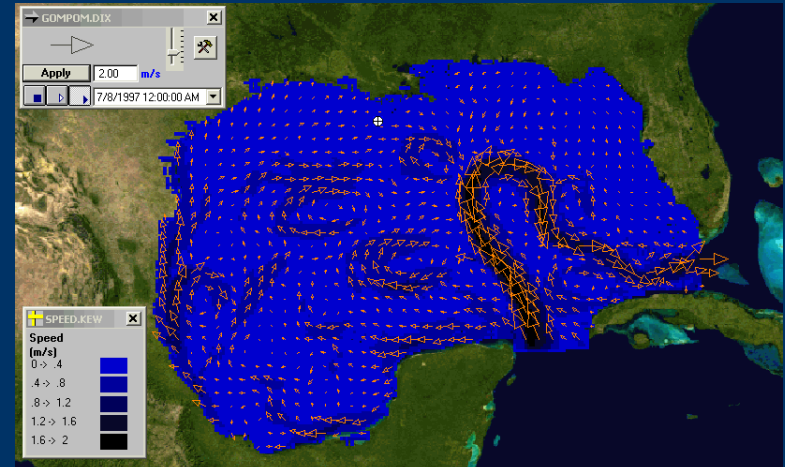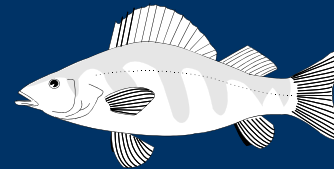
Physical Fate and Behavior Modeling

- Spreading
- Evaporation
- Dispersion
- Dissolution
- Emulsification
- Sedimentation
- Bio-degradation
- Photo-oxidation
- Shoreline and bottom interactions
- Oil-ice interaction

Biological Effects Modeling

- **Empirical-Retrospective Biological Impact Modeling (Beach Bird Model Approach) – for wildlife (back-calculations)**
- **Mechanistic-Predictive Biological Effects Model**
  - **Wildlife (Swept-Through Model Approach)**
  - **Fish and Invertebrates**
    - **Acute exposure**
    - **Long-term exposure**
    - **Production foregone**
  - **Lower trophic level production and food web losses**
  - **Intertidal, Wetland**
  - **Population and Ecosystem level changes**
  - **Restoration scaling**

Spill Response Modeling

- **Modeling of response to simulate effect of response strategies (mechanical recovery, booming, dispersants, in situ burning)**
  - **Changes trajectory and behavior of oil**
  - **Changes oil biological effects**
- **Inputs**
  - **Physical Transport (currents, winds, waves)**
  - **Physical Fate (oil location, physical attributes)**
- **Outputs (to Physical Fate Model)**
  - **Changed spill trajectory**
  - **Changed chemical makeup (e.g., burning)**
  - **Changes to oil in water column with dispersants**
- **Outputs useful for strategic response planning**

Discussion

- **Is something missing?**
- **Research needs?**
- **Where do we go from here with modeling?**