

# **Proposed Enhancements to the Mineral Management Service Commercial Marine Vessel Emission Inventory for the Gulf of Mexico**

**Richard Billings, Roger Chang, and Heather Perez,  
ERG, Research Triangle Park, NC**

**James Corbett, University of Delaware, Dover, DE**

**Sam Wells, Starcrest LLC, Houston, TX**

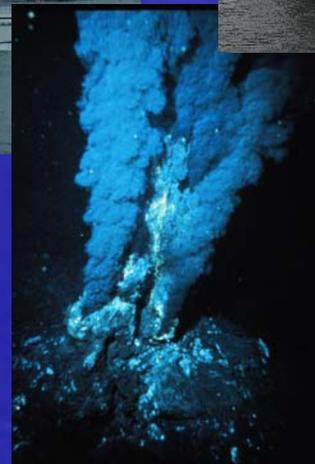
# Introduction

- OCS Sources
  - Drilling Rigs
  - Pipelaying Operations
  - Platform Construction & Removal
  - Support Helicopters
  - Support Vessels
  - Survey Vessels



# Introduction

- Non-OCS Sources
  - Bio-Geogenic Sources
  - Commercial Fishing Vessels
  - Commercial Marine Vessel Operations
  - Louisiana Offshore Oil Platform (LOOP)
  - Military Vessel Operations
  - Recreational Boating
  - Vessel Lightering



# Commercial Marine Vessel Estimates

Study	Pollutant (tons per year)		
	NO <sub>x</sub>	VOC	CO
<b>2000 MMS inventory</b>			
MMS Area ( Western & Central Gulf)	20,592	181	2,029
MMS (Eastern Gulf)	16,488	144	1,625
State Waters	33,961	298	3,347
<b>Gulf Total</b>	<b>71,041</b>	<b>623</b>	<b>7,001</b>
<b>1995 MMS Inventory</b>			
<b>Gulf Total</b>	<b>85,961</b>	<b>3,745</b>	<b>9,563</b>
Percent Difference	-17	-83	-27

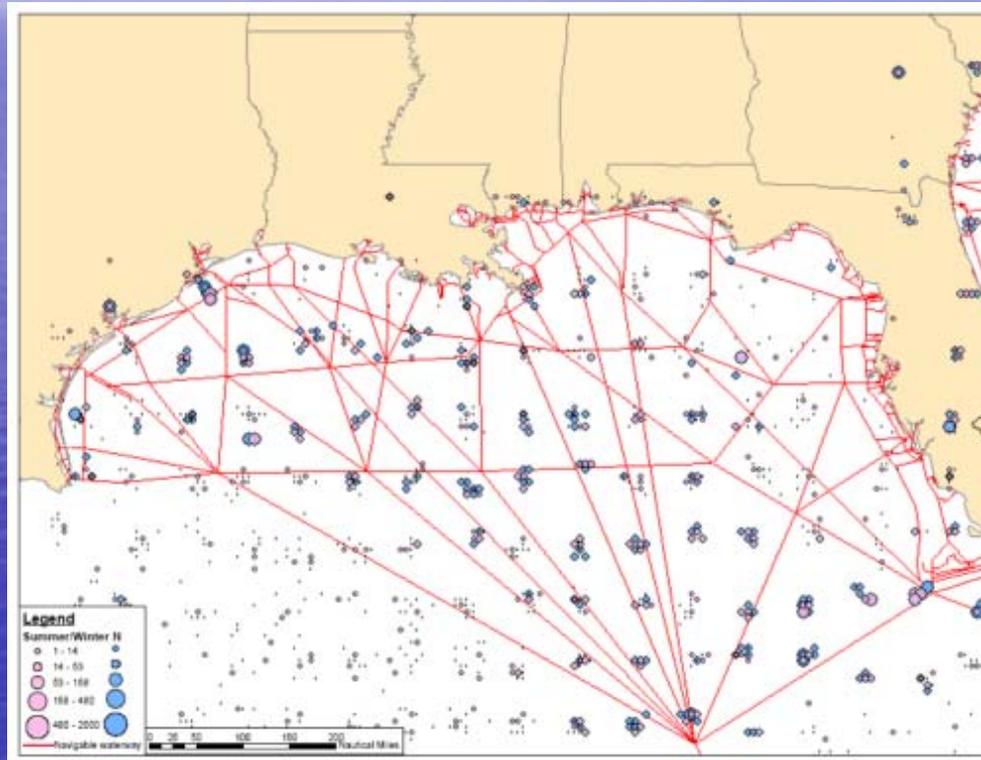
# Summary of ICOADS Data

Ship Observation Summary for 2002

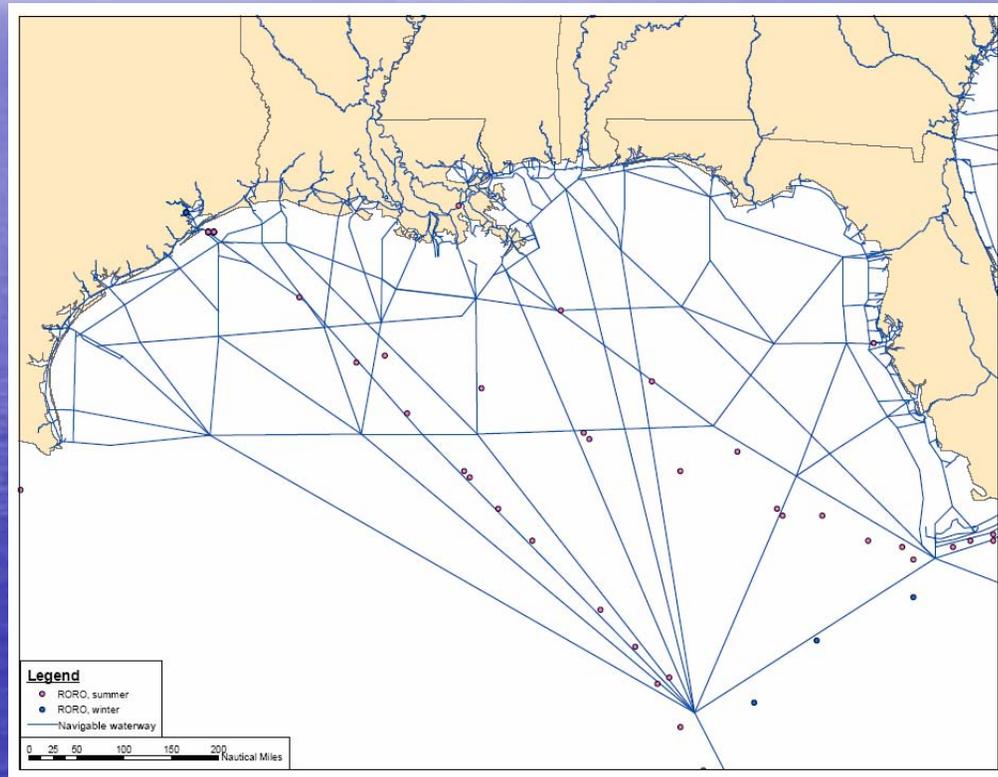
Months	1	2	3	4	5	6	7	8	9	10	11	12	Annual
Total Observations	78,019	72,887	78,384	76,413	81,663	79,002	84,848	84,778	80,833	86,421	84,030	78,916	966,194
Identified Ships	74,375	69,629	75,019	73,092	77,639	75,300	82,559	84,778	79,421	85,067	82,739	78,270	936,232
Unidentified Ships	3,644	3,258	3,365	3,321	4,024	3,702	2,289	1,656	1,412	1,354	1,291	646	29,962
Unidentified (% of total)	4.7	4.5	4.3	4.3	4.9	4.7	2.7	2.0	1.7	1.6	1.5	0.8	3.1
Unique Ships	2,770	2,691	2,855	2,868	3,049	2,998	3,208	2,264	2,252	2,263	2,240	2,1875	9,669
Observations per Ship	27	26	26	25	25	25	26	37	35	38	37	36	97



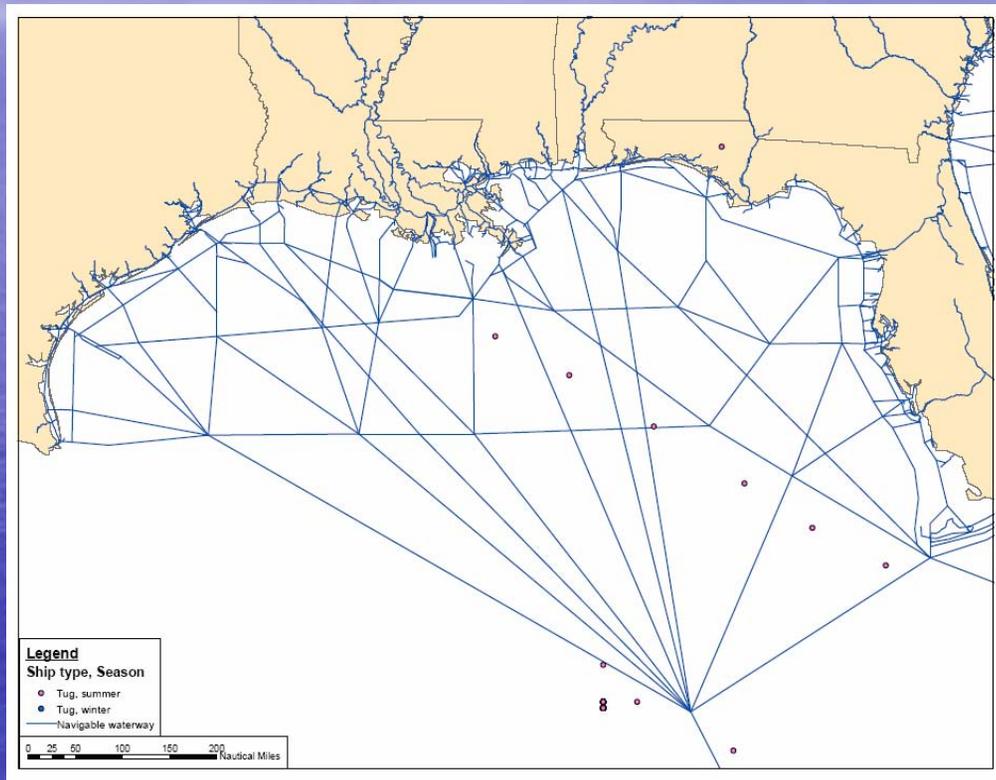
# ICOADS Activity vs ACE shipping Lanes



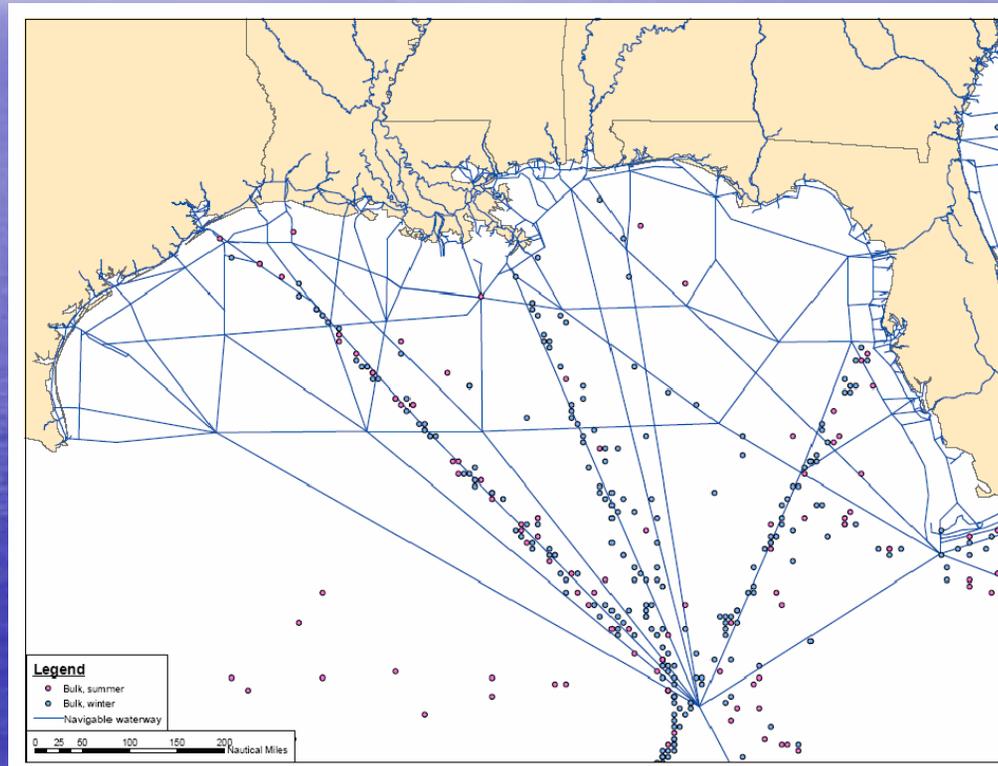
# Spatial Distribution of Roll-on / Roll-off Vessels



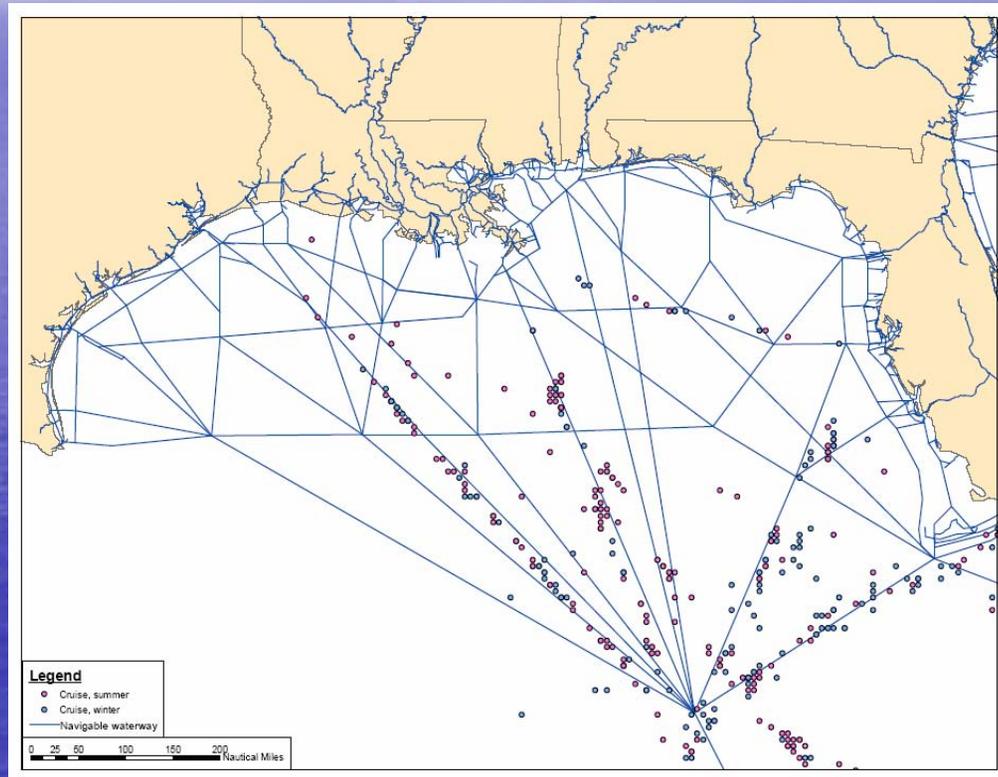
# Distribution of Ocean-Going Tug Operations



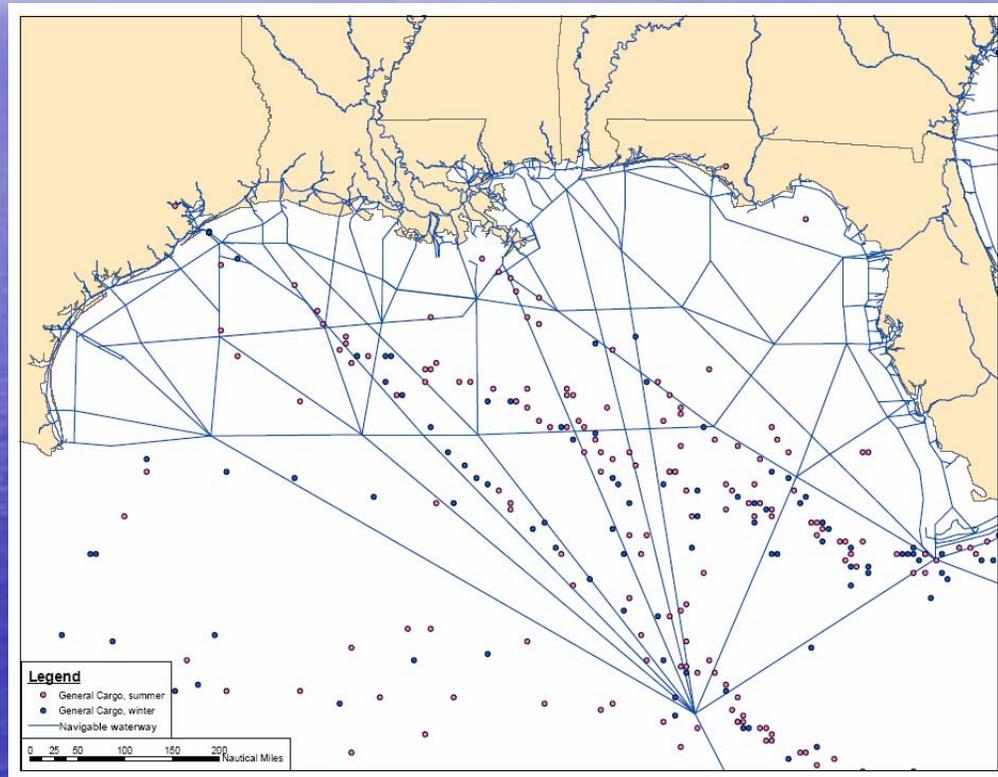
# Spatial Distribution of Bulk Carrier operations



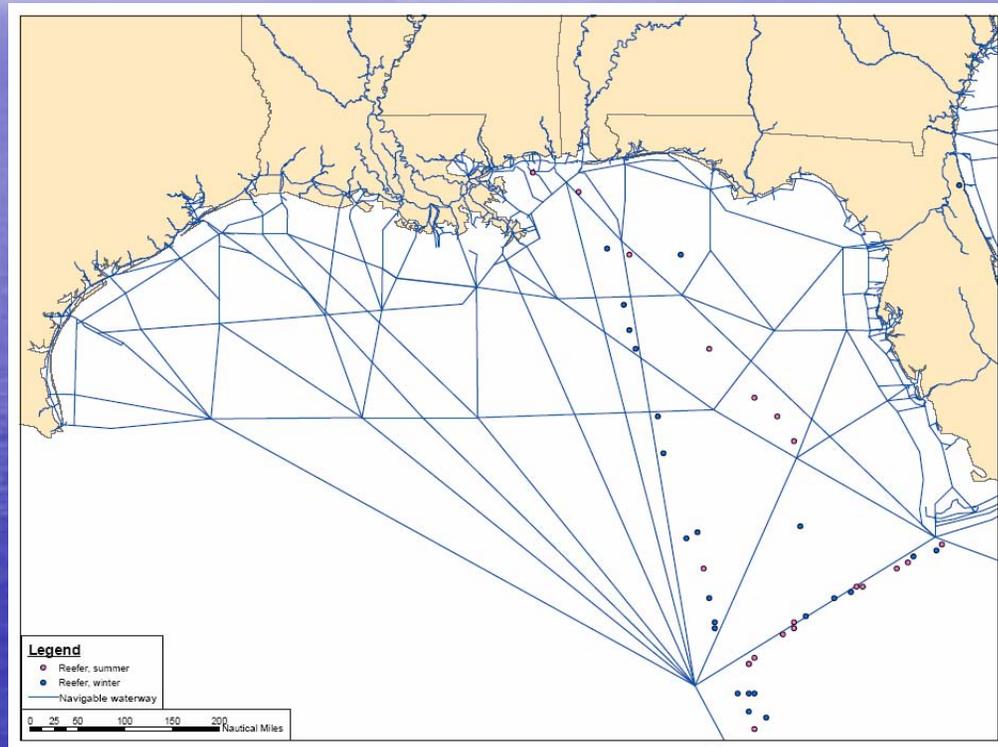
# Spatial Distribution of Cruise Vessel Operations



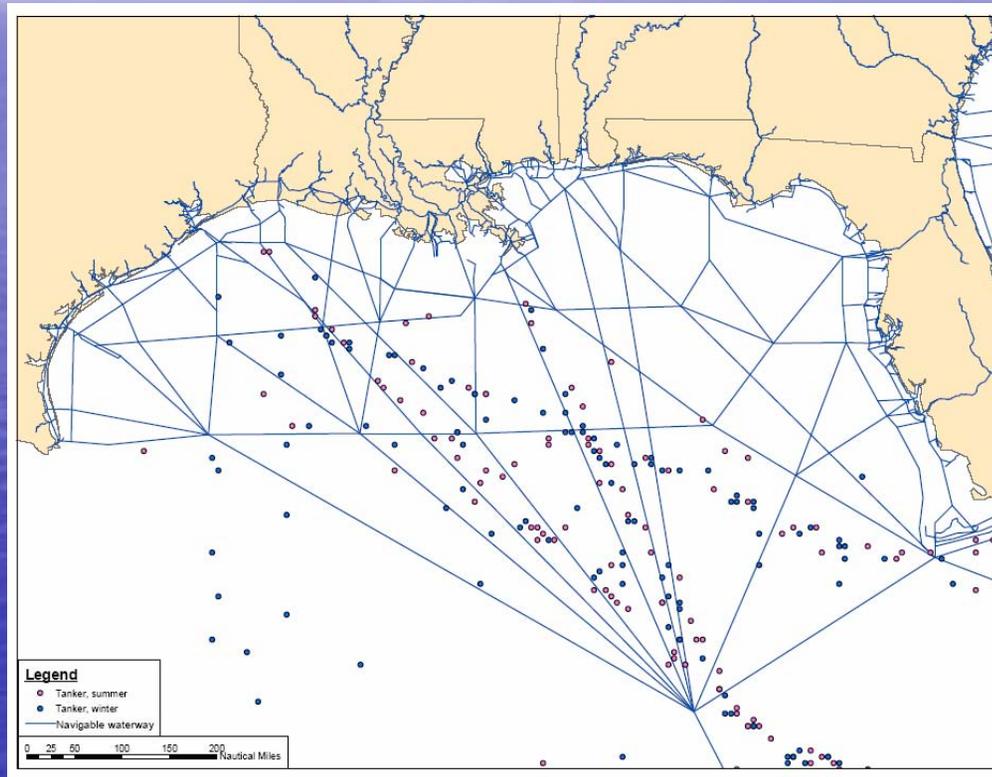
# Spatial Distribution of General Cargo Vessels



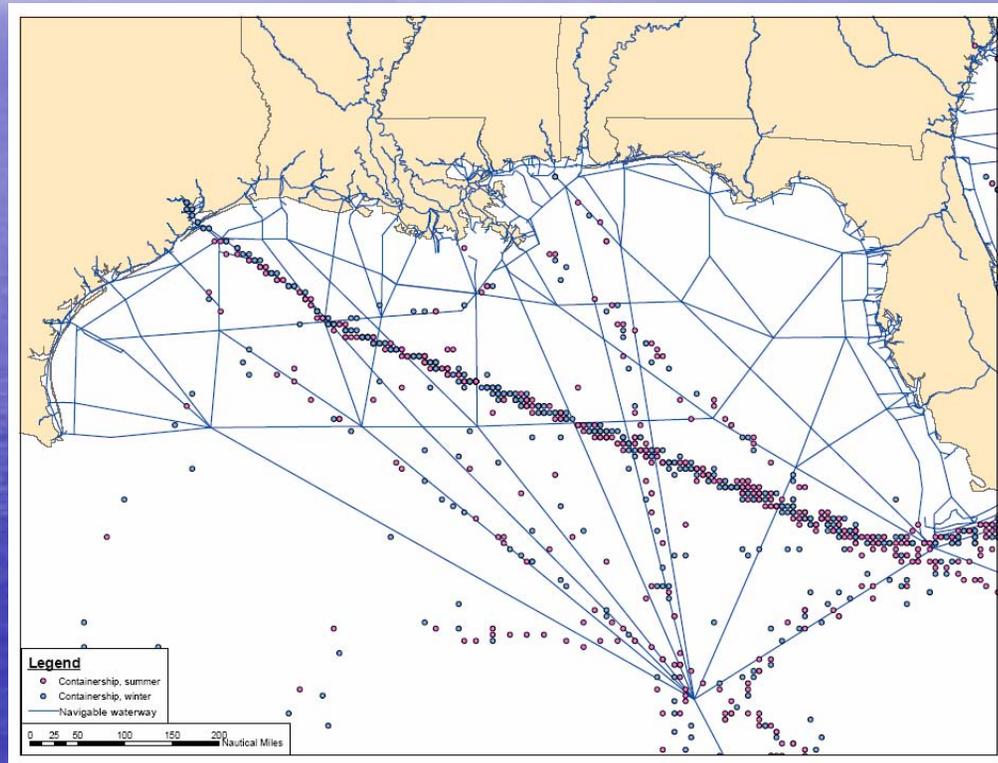
# Spatial Distribution of Refrigerated Vessels



# Spatial Distribution of Tanker Activity



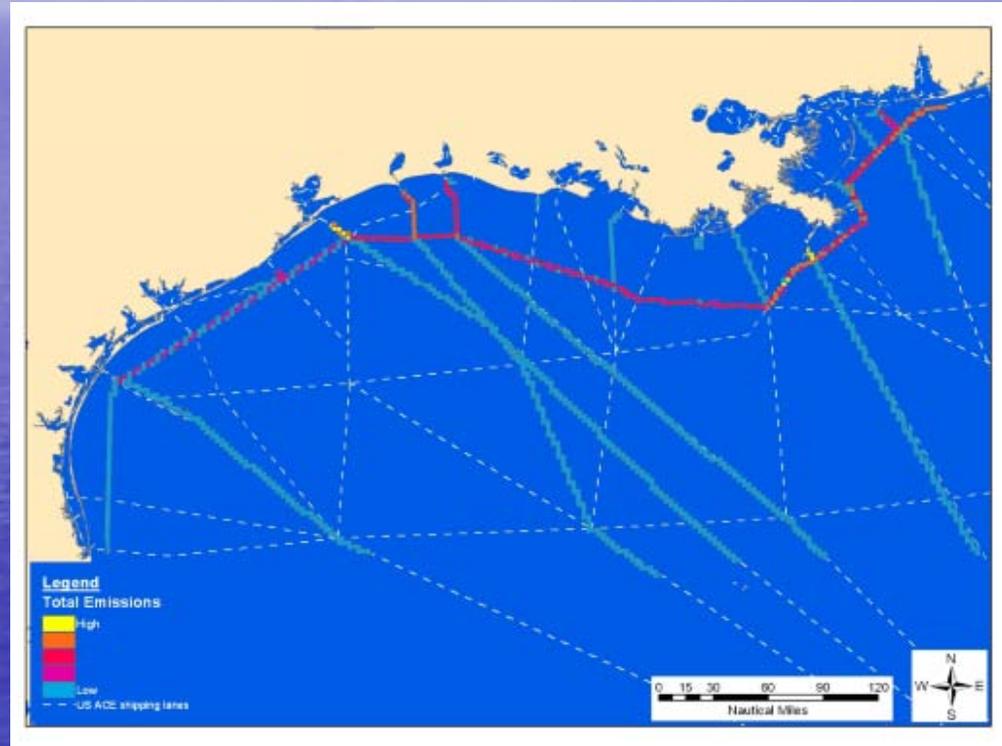
# Spatial Distribution of Containerized Vessels



## Average Characteristic by Vessel Type

Vessel Type	Dead Weight (tons)	Maximum Speed (knots/hr)	Total Vessel Power (kW)
Bulk	46,869	14	7,840
Containership	41,867	22	25,539
Cruise	5,559	20	<b>28,236</b>
Ferry	3,482	20	8,706
General Cargo	16,258	14	5,396
Reefer	8,554	18	7,444
RORO	14,746	16	9,012
Tanker	<b>60,811</b>	15	9,670
Tug	<b>746</b>	<b>13</b>	<b>2,912</b>

# Spatial Distribution of MMS 2000 CMV Emissions Using Army Corps of Engineers Data



# Activity Distribution of CMV Using ICOADS Data

