

SHIP PRODUCTION COMMITTEE
FACILITIES AND ENVIRONMENTAL EFFECTS
SURFACE PREPARATION AND COATINGS
DESIGN/PRODUCTION INTEGRATION
HUMAN RESOURCE INNOVATION
MARINE INDUSTRY STANDARDS
WELDING
INDUSTRIAL ENGINEERING
EDUCATION AND TRAINING

December 21, 2000
NSRP 0573
N1-98-1 Subtask 44

THE NATIONAL SHIPBUILDING RESEARCH PROGRAM

Shipyard/EPA Forum Project

U.S. DEPARTMENT OF THE NAVY
CARDEROCK DIVISION,
NAVAL SURFACE WARFARE CENTER

in cooperation with
National Steel and Shipbuilding Company
San Diego, California

Report Documentation Page

Form Approved
OMB No. 0704-0188

Public reporting burden for the collection of information is estimated to average 1 hour per response, including the time for reviewing instructions, searching existing data sources, gathering and maintaining the data needed, and completing and reviewing the collection of information. Send comments regarding this burden estimate or any other aspect of this collection of information, including suggestions for reducing this burden, to Washington Headquarters Services, Directorate for Information Operations and Reports, 1215 Jefferson Davis Highway, Suite 1204, Arlington VA 22202-4302. Respondents should be aware that notwithstanding any other provision of law, no person shall be subject to a penalty for failing to comply with a collection of information if it does not display a currently valid OMB control number.

1. REPORT DATE 21 DEC 2000		2. REPORT TYPE N/A		3. DATES COVERED -	
4. TITLE AND SUBTITLE The National Shipbuilding Research Program, Shipyard/EPA Forum Project				5a. CONTRACT NUMBER	
				5b. GRANT NUMBER	
				5c. PROGRAM ELEMENT NUMBER	
6. AUTHOR(S)				5d. PROJECT NUMBER	
				5e. TASK NUMBER	
				5f. WORK UNIT NUMBER	
7. PERFORMING ORGANIZATION NAME(S) AND ADDRESS(ES) Naval Surface Warfare Center CD Code 2230-Design Integration Tower Bldg 192, Room 128 9500 MacArthur Blvd Bethesda, MD 20817-5000				8. PERFORMING ORGANIZATION REPORT NUMBER	
9. SPONSORING/MONITORING AGENCY NAME(S) AND ADDRESS(ES)				10. SPONSOR/MONITOR'S ACRONYM(S)	
				11. SPONSOR/MONITOR'S REPORT NUMBER(S)	
12. DISTRIBUTION/AVAILABILITY STATEMENT Approved for public release, distribution unlimited					
13. SUPPLEMENTARY NOTES					
14. ABSTRACT					
15. SUBJECT TERMS					
16. SECURITY CLASSIFICATION OF:			17. LIMITATION OF ABSTRACT SAR	18. NUMBER OF PAGES 71	19a. NAME OF RESPONSIBLE PERSON
a. REPORT unclassified	b. ABSTRACT unclassified	c. THIS PAGE unclassified			

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Final Report

Shipyard/EPA Forum Project
Project No. N1-98-1 Subtask 44

Prepared by:
Atlantic Marine, Inc.
&
Dana M. Austin Environmental Consulting, Inc.

For:
National Steel & Shipbuilding Company
Harbor Drive and 28th Street
P.O. Box 85278
San Diego, CA 92186-5278

In Behalf Of:
NATIONAL SHIPBUILDING RESEARCH PROGRAM
FACILITIES AND ENVIRONMENTAL EFFECTS PANEL
SP-1

December 20, 2000

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Shipyard/EPA Forum Project

Introduction

This project was sponsored by the Special Testing and Studies Committee (“Ad-Hoc”) of the Environmental Technical Panel (“SP-1”) to provide initial funding to develop an ongoing cooperative dialogue with senior national, regional and state environmental agency personnel. The goal of this project is to provide the means to facilitate this dialogue in the most cost-effective manner. A secondary goal of this project is to provide the shipyards with a significant resource on technical environmental issues of concern. After approval of this project’s original proposal, the members of the Ad-Hoc committee requested that this project’s scope of work be modified to more closely align itself with the U.S. Environmental Protection Agency’s Sustainable Industry Program’s US Shipbuilding and Repair Industry Section project. This was accomplished by reformatting this project’s Task Deliverables to correspond with the EPA’s Sustainable Industry project goals. Additionally, the EPA provided funding to expand the overall scope of the work to include specific Sustainable Industry project deliverables.

This portion of the overall NSRP/EPA-SI project now consists to two Task Deliverables:

1. Development of a comprehensive US Shipbuilding and Repair Industry Sector contact database; and
2. Performance and analysis of a Shipyard Environmental Issues of Concern survey.

This report documents the results of these two tasks. Additional reports will be prepared and provide to the NSRP regarding the results of additional Tasks funded by the EPA-SI and other sources. The final collection of these reports will be considered to be the Final Project Report for both the NARP and EPA-SI.

Task 1: Development of US Shipbuilding and Repair Industry Sector Database

Introduction

The primary prerequisite to establishing an effective shipyard communication network was to prepare a database of all known existing shipyard facilities. This database would need to include basic contact information regarding both the location of, and personnel at each identified facility. This database could then be used to distribute information via an appropriate method (mail, telephone, fax and/or e-mail) to the shipyard, and to record information being returned from the shipyard.

Although there are several existing lists of shipyards that are maintained by various trade publications and government agencies, prior experience has demonstrated that these sources were dated and contained erroneous information. Additionally, some required information necessary for this project would not be available from the existing lists. For these reasons, it was necessary to generate the required list of shipyards de novo.

Defining a Shipyard

Conventional industry wisdom held that there were approximately 200 - 400 existing shipyard facilities located in the United States. The difference in this estimated range of approximate 200 facilities is mostly likely caused by differences in how one defines a facility as a “shipyard.” Facilities are most commonly defined as a “shipyard” based upon their physical location, the types of facilities, and the types of operations and processes conducted at that location. For example, if a facility is located on the land adjacent to a navigable waterway, has facilities to dock or moor ships, and conducts abrasive blasting and marine coating application operations – most people would agree that the facility was a shipyard. On the other hand, if a facility is located inland without water access, has no facilities to dock ships, and only applies marine coatings to small parts removed from ships – many people would not define the facility as a shipyard.

It was necessary for the purposes of this project to develop a consistent definition of a shipyard in order to allow the necessary determination of whether a facility should, or should not, be listed in the database. After review of various “official” definitions of “shipyard” and consultation with knowledgeable shipyard personnel, the following definition was crafted:

A shipyard is any facility that meets both of the following criteria:

- 1. The primary activity of their facility is the construction or repair of ships.*
- 2. The facility self-identifies it's SIC Code as 3732.*

This definition allows for the broadest inclusion of facilities as shipyards without regard to specific factors such as physical location or types of operations. Its also limits the definition to those facilities that actual build or repair ships, as opposed to those that may only provide a limited service involved in shipbuilding and/or repair. Note that this definition places no limits on the scale of operations, size of facility, number or employees or gross income necessary to be considered a shipyard. Both a large facility with 5,000 employees and a billion dollar back log, as well as a 10 man operation location repairing fishing trawlers on the back-waters of the Bayou would both be defined as a shipyard.

Development of Shipyard Database

Database Development

A database was designed and developed using Microsoft Access software. The database was designed to include pertinent data fields necessary to record the contact information regarding the facility name, location, personnel, and telephone and fax numbers. Additional fields were also included that in order to capture necessary data important to this specific project. The technical parameters of the database are present in Appendix 1 of this report.

Sources of Shipyard Contact Information

Lists of potential shipyards contacts were obtained from varied sources, ranging from trade publications, government agencies and Internet sources. The specific list of sources is provided in Table 1 below:

Table 1: Sources of Shipyard Lists

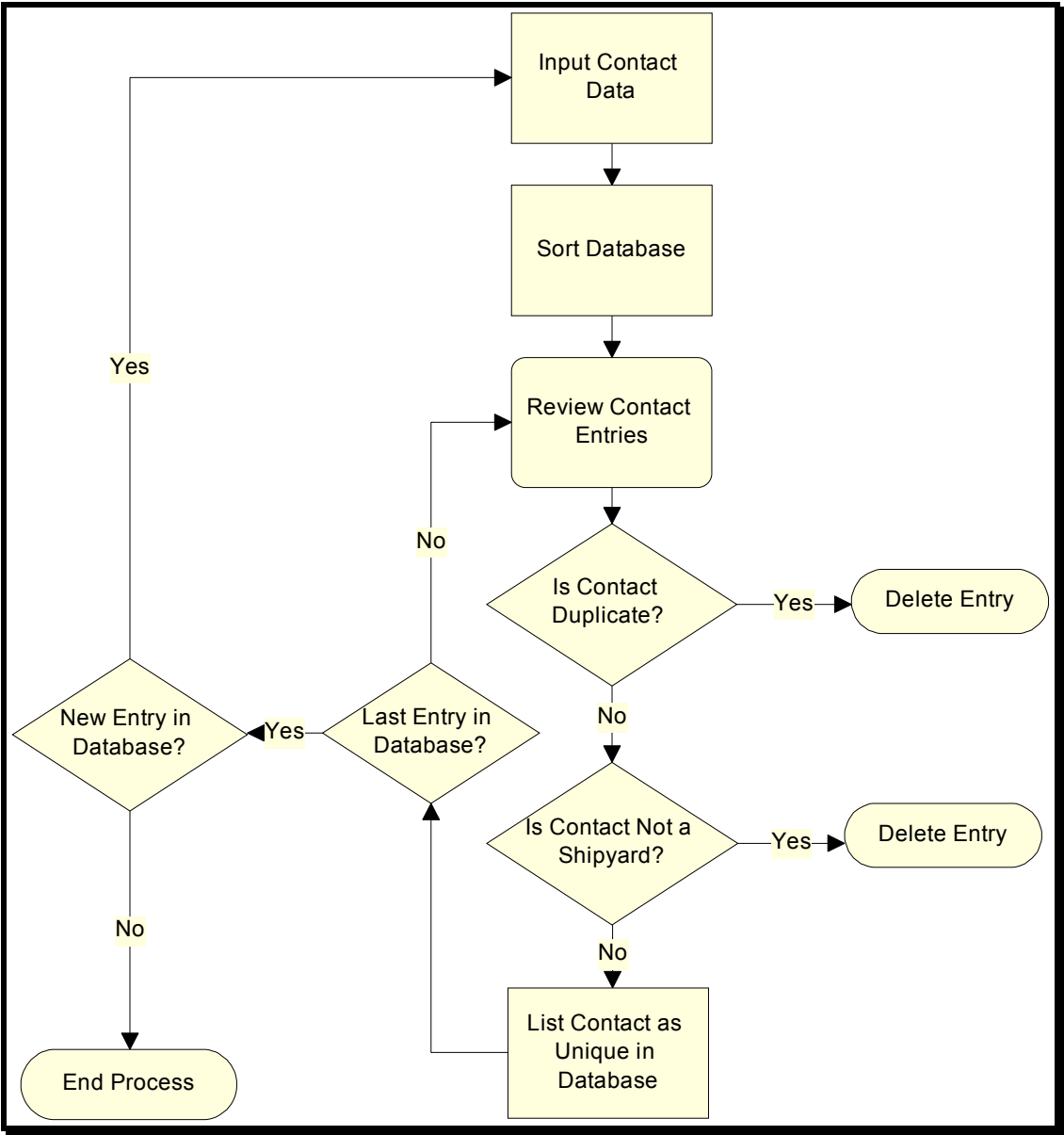
Source	Type	Comments
National Shipbuilding Research Program Mailing List	Organization mailing list	Generally only contacts listings of shipyards that participate in NSRP activities.
SIC Code 3732 Listings	Business Directory List	Limited listings, but contained accurate contact information.
Pacific Maritime Magazine	Trade Publication	Publishes annual Directory of West Coast Shipyards. Shipyard advertisements.
Marine Log	Trade Publication	Publishes annual Directory of US Shipyards. Directory is also posted on Marine Log website Shipyard advertisements.
Report on Survey of US Shipbuilding and Repair Facilities	Maritime Administration report.	Primarily covers larger facilities.
Shipyard Activity Report	Maritime Administration report.	
Maritime Global Net	Internet listing	Numerous shipyard listings, many are dated and/or erroneous.
Marine News	Trade Publication	Shipyard advertisements
Maritime Reporter and Engineering	Trade Publication	Shipyard advertisements
Shipyard Personnel Contacts	Personal sources	Provided up-dated information regarding shipyards and contact information.
Gulf Coast Maritime Technology Center	Mailing List	Primarily Gulf Coast Shipyards.
Shipbuilders Council of America	Membership Director	Limited to SCA member shipyards.

Contact information from the above source lists were entered into the database. From these lists a total of approximately 980 database contacts were derived.

Contact Input Model

The contact data input into the Shipyard Database was developed using the methodology diagramed in Figure 1 on the following page. This procedure was designed to ensure that not only relevant (i.e. shipyard facilities currently in operation in the US) contacts were recorded in the database, but also a record of all potential contacts was made as well. As the development of the database was (and is) an ongoing and reiterative process, this allowed newly discovered contacts to be compared to previously listed contacts to determine if the new contact had been previously evaluated.

Map 1: Contact Input Flowchart



Duplicate and “Not a Shipyard” Entries

The identification of duplicate contact entries was accomplished by sorting the database by primary contact fields, (Company Name, Address and Telephone Number) and then scanning the records for similar entries. Similar entries were examined, and if duplicative, combined. The empty record fields were then deleted.

In many instances database entries that were clearly “Not a Shipyard” could be identified while scanning the database records. In those situations the record was deleted from the database. If there was any doubt regarding whether a listed facility was Not a Shipyard, the record was maintained until additional status verification could be performed.

Following this procedure, approximately 340 contact entries in the database were determined to be duplicates and were eliminated. The database now contains approximately 640 unique entries.

Confirmation of Contact Status

The confirmation that a facility listed in the database was an existing shipyard currently operating in the United States was accomplished using a three step process. The first step was to attempt to contact the facility by telephone. If the listed facility could be contacted by telephone (numerous database entries had incorrect or disconnected phone numbers) the contact was asked if the facility were a shipyard. If the response was “no,” the database entry was deleted. If the response was “yes,” the contact was asked to verify, or provide missing facility contact information. This process resulted in approximately 320 of the 640 database entries being confirmed as a shipyard.

The second step in confirmation of contact status was to request a current telephone number from Directory Assistance, using the Company Name and City of location, for the approximately 320 facilities not verified by telephone contact. Telephone numbers for an additional 25 facilities were obtained from Directory Assistance. These facilities were contacted by telephone using the procedure in step one above, and their status was then confirmed.

The third step was a direct mailing of a survey form to those contacts with no known telephone numbers, but with a listed address. The survey form requested confirmation regarding status as a shipyard, and verification of contact information. Approximately 300 letters were mailed to the last known address of the facility. Approximately 200 letters were returned by the US Post Office, due to that fact the facility was no longer in business or other reasons. Of the approximately 100 letters not returned, 75 facilities responded to the survey.

This three-step confirmation process resulted in 396 facilities being confirmed as shipyards out of the original 690 database entries.

Shipyard Communication Plan

The second phase of the shipyard database project was to develop a method for communicating with and receiving information from the shipyards. For this purpose the software application Microsoft Outlook was chosen. This was done for the following reasons:

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1. Data could be easily imported and exported from and to the Access database;
2. Outlook provides extensive communication options, including e-mail, fax and mailings;
3. Outlook is in common usage for business, including shipyards;
4. Outlook could be easily customized to meet the specific needs of this project; and
5. Outlook has an extensive capacity to record information regarding contacts and analyze this information.

“Outlook” Shipyard Contact File

An Outlook contact file was created for the specific information contained in the Master Shipyard database. This required the creation of a custom Outlook contact form necessary to record required shipyard contact data that was necessary for this project.

The Access database of Confirmed Shipyards was then imported into the custom Outlook Contact Form. From this software platform, a variety communication functions can be performed. These include:

1. Mail merge the Outlook contacts (all or any selected group) with documents prepared in Microsoft Word for direct mailings;
2. Mail merge the Outlook contacts (all or any selected group) with documents prepared in Microsoft Word and then merged with, and transmitted using Symantec WinFax software¹; and
3. Transmit messages and files via e-mail to all or any selected group of Outlook contacts.

These various communication options will allow the transmittal of information to shipyards in a selected and targeted manner. For example, the Outlook contact file could be sorted to show only shipyards located within a certain geographic region of the United States, such as the Gulf Coast, or even a specific state or city. Information regarding an issue of concern to shipyards located in that selected region could then be transmitted using any selected option (mailing, fax or e-mail) or any combination of those options.

Incoming information received back from the targeted facility can then be recorded and stored in the appropriate format (either the Shipyard Database or Outlook file) for analysis and preparation of reports.

Fax-Back Contact Survey

A contact information survey was the first use of the shipyard communication system described above. This survey consisted of a one page “fax-back” survey requesting confirmation of existing data, and requesting missing data regarding the shipyards. This was accomplished by

1 Outlook has no direct faxing capability, but can be used with compatible fax software, such as WinFax.

preparing a "mail-merge" survey document in Microsoft Word, merging this document with the shipyard contact file, and then transmitting these documents via fax-modem using WinFax.

A total of 394 surveys were faxed to recipient shipyards over a 10-hour period. Approximately 100 surveys² were faxed-back over the next several days with the requested data. Corrections and additions to the contact information were made to the Master Shipyard Database and the Shipyard Outlook Contact file as provided in the returned surveys.

US Shipbuilding and Repair Industry Sector – List of Shipyards

A list of all shipyard facilities contact names contained in the Master Shipyard database, sorted by State, is provided below. While this list is considered to be the most accurate currently existing list, it will certainly contain errors of both omission and commission. Readers are invited to provide the report authors with any additions, corrections or comments regarding the list of shipyards, based upon their specific knowledge of the industry.

State: Alaska

- Alaska Ship and Drydock Inc.
- Alaska Vessel
- Allen Marine
- Seward Ship's Drydock
- Walashek Shipyard, Inc.

State: Alabama

- Alabama Shipyard Inc.
- Atlantic Marine, Inc.- Mobile
- Austel USA, LLC
- Bender Shipbuilding & Repair Co., Inc.
- Gazzier Shipyard, Inc.
- Harrison Brothers Dry Dock & Repair Yard, Inc.
- Henry Marine Service
- Horizon Shipbuilding
- LaForce Shipyard
- Master Boat Builders, Inc.
- Master Marine, Inc.
- Mobile Drydock Co., Inc.
- Nelson Boat Yard Inc.
- Steiner Shipyard, Inc.

State: Arkansas

- SeaArk Marine

² This represents a survey return rate of over 25%.

State: California

A & E Industries
Al Larson Boat Shop
Anderson Boat Yard Inc.
Bay City Marine, Inc.
Bay Ship & Yacht Co.
Channel Islands Boat Yard
Continental Maritime Industries Inc.
Fashion Blacksmith, Inc.
General Engineering & Machine Works
Goltens Marine Co. of Wilmington
Marine & Industrial Repair
Marine Dockside & Industrial Inc.
National Steel & Shipbuilding Company
Pacific Defense Systems (PDS)
Pacific Ship Repair and Fabrication
PacOrd, Inc.
San Francisco Drydock Inc.
San Pedro Boat Works
Southwest Marine
Southwest Marine
Ventura Harbor Boatyard

State: Connecticut

General Dynamics Electric Boat Corp.
Thames Shipyard & Repair Co.

State: Florida

Atlantic Dry-Dock Corp.
Atlantic Marine Inc.-Mayport
Atlantic Marine, Inc.
Bay Fabrication Inc.
Boston Whaler, Inc.
Broward Yachts, Inc.
Centrifugal Rebabbiting Inc.
Derecktor of Florida
Detyens Shipyard, Inc.
Eastern Shipbuilding Group
Eastern Shipyards, Inc.

Fort Myers Yacht & Shipbuilding
Freeport Shipbuilding & Marine Repair Inc.
Global Marine Systems
Global Piping Inc.
Goltens Miami
Gulf Marine Repair Corp
Harley Boat Company
Hendry Corporation
International Ship Repair & Marine Services, Inc.
Jones Boat Yard, Inc.
Keith Marine Inc.
Marine Inland Fabricators
Merrill-Stevens Drydock Co
Norse Diesel Repairs, Inc.
Norseman Industries Inc.
North Florida Shipyard, Inc.
Patti Shipyard, Inc.
Port Everglades Machine Works
Queen Craft Shipyard
St. Augustine Marine
Sun State Marine
Tampa Bay Shipbuilding & Repair Company
Trident Shipworks, Inc.

State: Georgia

Intermarine Savannah
Palmer Johnson, Inc.
Savannah Marine Services, Inc.

State: Hawaii

Ala Wai Marine Ltd.
Honolulu Marine Inc.-Kewalo Shipyard
Honolulu Shipyard, Inc.
Keehi Marine, Inc.
Marisco, LTD.
Navatek Ships Ltd.
Pacific Marine & Supply Co. Limited
Young Brothers Tug & Barge Corp

State: Iowa

Hall Towing, Inc.

State: Illinois

Black Marine, Inc.

Clearyville Marine Service, Inc.

Crowley's Yacht Yard, Inc.

Hamms Holiday Harbor

Hannah Marine Corp.

National Maintenance & Repair

Osage Repair

Riverway Repair

Service Welding & Shipbuilding

State: Indiana

Corn Island Shipyard, Inc.

Evansville Materials, Inc.

Jeffboat, Inc.

Marine Builders, Inc.

State: Kentucky

James Marine, Inc.

National Maintenance and Repair of Kentucky, Inc.

Ohio Valley Marine Service, Inc.

Owensboro Harbor Service, Inc.

Paducah River Services

Triple 'S' Welding & Marine

Walker Boat Yard, Inc.

Yager Materials

State: Louisiana

Acadian Shipyard, Inc.

Allied Shipyard, Inc.

Allied Shipyard, Inc.

Ambar Marine

Avondale Industries Inc.

Avondale Industries Inc.

Azalea Fleet, Inc.

Barnett Marine Inc.

Barnett Shipyard

Bayou Boeuf Shipyard, Inc.

Berwick Shipyard
Boland Marine & Manufacturing, Co.
Bollinger Algiers, LLC
Bollinger Amelia Repair, LLC
Bollinger Calcasieu, LLC
Bollinger Fourchon, LLC
Bollinger Gretna, LLC
Bollinger Gulf Repair
Bollinger Larose, LLC
Bollinger Marine Fabricators, LLC
Bollinger Morgan City, LLC
Bollinger Quick Repair, Inc.
Bollinger Shipyards Lockport, LLC
Bourg Drydock & Service Co.
Breux Brothers Enterprises
Breux's Bay Craft, Inc.
Buck Kreihs Company, Inc.
C-Craft Shipyard Corp.
CGB Marine Services Co.
Chand Corporation, LLC
Conrad Industries, Inc.
David Industries, Inc.
Diversified Group, Inc.
Dixie Machine Welding & Metal Works, Inc.
Dixie Shipyard, Inc.
Douglas Marine Service, Inc.
Elevating Boats, Inc.
Elmwood Dry Dock & Repair, Inc.
Fred Settoon, Inc.
Gnots Reserve, Inc.
Grand Isle Shipyard
Gulf Craft Inc.
Gulf Craft, Inc.
Halter Lockport/Halter Marine Inc.
HB Buster Hughes Fabrication
Houma Marine Fabricators, Inc.
Hudson Drydock, Inc.

Intercoastal City Dry dock
Intercoastal Marine Repairs, Inc.
Intracoastal City Dry Dock
Kody Marine, Inc.
L.M.S. Shipmanagement Inc.
LEEVAC Shipyards, Inc.
Main Iron Works, Inc.
McDonough Marine Service
McDonough Marine Service
National Maintenance and Repair of Louisiana
Neuville Boat Works, Inc.
North American Shipbuilding, Inc.
Ocean Technical Services Inc. (OTECH)
Pax, Inc.
Pelican Shipyard & Machine Shop
Plaquemine Point Shipyard
Production Management Corp.
Quality Shipyards, Inc.
Regional Fabricators, Inc.
Stephens Shipyards, Inc.
Sun State Marine Services, Inc.
Superior Shipyard & Fabrication
Swiftships, Inc.
T.T. Barge
T.T. Barge Cleaning, Inc.
T.T. Coatings
Textron Marine & Land Systems
Tidewater, Inc.
Total Marine Services, Inc.
Trinity Marine Products
Trinity Marine Products
Trinity Yachts, Inc.
Verret Shipyard

State: Massachusetts

D.N. Kelley & Son Inc.
Fairhaven Shipyard & Marina, Inc.
General Ship Corporation

Gladding-Hearn Shipbuilding, The Duclos Corp.
Gloucester Marine Railways Corp.

State: Maryland

Baltimore Marine Industries
Chesapeake Shipbuilding Corp.
General Ship Repair Corp.
USCG Yard Curtis Bay
Yacht Maintenance Co., Inc.

State: Maine

Bath Iron Works Corp.
Bay Engineering
Gamage Shipbuilders Inc.
Gowen, Inc.
Industrial Welding & Machine, Inc.
Rockland Marine
Washburn & Doughty Assoc., Inc.

State: Michigan

Broward Marine Inc.
MCM Marine Inc.
Nicholson Terminal & Dock Co.

State: Minnesota

Upper River Services, Inc.

State: Missouri

Humboldt Boat Service Co.
JB Marine Service
Kiesel Marine Service, Inc.
Missouri Dry Dock & Repair Co., Inc.
Trinity Marine Products

State: Mississippi

Big River Shipbuilders, Inc.
Colle Towing Co., Inc.
Flechas Shipyard, M.M.
Friede Goldman-Halter Marine Group, Inc.
Friede Goldman-Halter-Pascagoula
Halter Moss Point/Halter Marine Inc.
Halter - Port Bienville
Ingalls Shipbuilding

Mississippi Marine Central Yard
Mississippi Marine Corporation
Moss Point Marine/Halter Marine Inc.
Sea-Fab, Inc.
Superior Boat Works, Inc.

State: New Jersey

Banks Ship Rigging Corp
Brady Marine Repair
Kerney Ship Repair, Inc.
Ocean Yachts, Inc.
Union Dry Dock & Repair Co.
Viking Yacht Co.
Yank Marine. Inc

State: New York

ACME Repair Co., Inc.
B & A Marine Co., Inc.
Caddell Dry Dock & Repair Company, Inc.
Derecktor Shipyards
Eastern Technical Enterprises
Feeney Ent., Inc., Thomas J.
GMD Shipyard
Golten New York Corp.
Jim's Pump Repair Inc.
May Ship Repair Contracting Corp
Muller Boat Works, Inc.
Reynolds Shipyard Corp.
Steel Style Inc.
Sterling Harbor Shipyard & Marina
Stevens Technical Service, Inc.

State: Ohio

Cleveland Ship Repair Co.
Economy Barge Repair
Great Lakes Towing, Co.
H. Hansen Industries
McGinnis, Inc.
O-Kan Dock & Machine
South Point Barge Co., Inc.

Superior Marine Inc.
Toledo Ship Repair Co.

State: Oklahoma

Johnston's Terminal

State: Oregon

Astoria Marine Construction Co.
Cascade General, Inc.
Charleston Shipyard
Diversified Marine, Inc.
Foss Maritime
Fred Wahl Construction
Gunderson Marine
Mar Com, Inc.
Sells Marine Service
Southern Oregon Marine, Inc.
Sundial Marine Tug & Barge Works Inc.
Zidell, Inc.

State: Pennsylvania

Barge Maintenance, Inc.
Blank Welding
C & C Marine Maintenance Co.
Hiller Barge
Industry Terminal & Salvage Co.
Kvaerner Philadelphia Shipyard Inc.
Premier Marine
River Salvage Co., Inc.

State: Rhode Island

American Shipyard Corp.
Blount Industries, Inc.
Little Harbor Marine
Promet Marine Services Corp.

State: South Carolina

Braswell Shipyards, Inc.
Charleston Ship Co.
Detyens Shipyards, Inc.
Metal Trades, Inc.
Ross Marine

State: Tennessee

Fullen Dock/Port 740
Great Rivers Marine Services/Ingram Barge Co.
New Johnsonville Marine Service
Serodino Shipyard
Vanguard Services, Inc.
Wepfer Marine, Inc.

State: Texas

AMFELS, Inc.
Baron's Marine Ways
Bludworth Marine LLC
Bollinger Houston, LP
Bollinger Texas City, LP
Border Shipyards, Inc.
Burton Shipyard, Inc.
Carotex, Inc.
Channel Shipyard Company, Inc.
Crumpler's Machine & Welding Service Inc.
Crumpler's Shipbuilding Co.
Etpmusa, Inc.
First Wave Greens Bayou Facility
First Wave Marine
First Wave Newpark Shipbuilding and Repair
First Wave Newpark Shipbuilding Galveston Facility
First Wave Pasadena Facility
Freide Goldman Halter-Offshore
Freide Goldman Offshore-Corporate Office
Friede Goldman-Halter Offshore
Glendale Boat Works, Inc.
Gulf Copper & Manufacturing Corp.
Houston Ship Repair
King Fisher Marine Service, Inc.
Kiva Construction & Engineering Inc.
Mile 533 Shipyard Inc.
Orange Shipbuilding Co., Inc.
Sabine Offshore Service, Inc.
Sneed Shipbuilding

Southwest Barge Fleet Service
Southwest Marine
Texas Barge & Boat Inc.
Vessel Repair, Inc.
West Gulf Marine Works Inc.
Zimco Marine Inc.

State: Virginia

Advex Corp.
Alco Welding & Machine Co.
Associated Naval Architects, Inc.
Colonna's Shipyard
Davis Boat Works, Inc.
Fabrication & Boiler Services, Inc.
Holmes Brothers Enterprises, Inc.
Lyon Shipyard, Inc.
Metro Machine Corp.
MHI Ship Repair and Services
MIL Dominion Inc.
Moon Engineering Co., Inc.
Moon Engineering Co., Inc.
Newport News Shipbuilding & Drydock Co.
Norfolk Naval Shipyard
Norfolk Shipbuilding & Drydock
Technico

State: Washington

Bellingham Bay Shipyard, LLC
Cap Sante Marine
Christensen Shipyard
Dakota Creek Industries, Inc.
Delta Marine Industries, Inc.
Duwamish Shipyard, Inc.
Fishermen's Boat Shop, Inc.
Fishing Vessel Owners Marine Ways, Inc.
Foss Maritime Shipyard
Kvichak Marine Industries
Lake Union Drydock Company
Le Clercq Marine Construction

MARCO Seattle, Inc.
Marine Industries Northwest, Inc.
Martinac Shipbuilding Corp.
Modutech Marine, Inc.
Nichols Brothers Boat Builders, Inc.
Northlake Shipyard Inc.
Pacific Fishermen, Inc.
Pacific Ship Repair & Fabrication Inc.
Puglia Shipbuilding, Inc.
Shipwright's Co-op
Thompson Metal Fabricators
Todd Pacific Shipyards, Inc.
Westport Shipyard, Inc.

State: Wisconsin

Bay Shipbuilding Company
Brennan Marine, Inc.
Burger Boat Co., Inc.
Edward E. Gillen Co.
Fraser Shipyards, Inc.
Marinette Marine Corp.
Palmer Johnson of Racine Inc.
Palmer Johnson, Inc.

State: West Virginia

Amherst Barge Repair
Joe S. Towing Co., Inc.

US Shipbuilding and Repair Industry Sector – Locations of Shipyards

Location maps of all confirmed shipyards for the United States and several geographical locations were prepared using Microsoft MapPoint 2001. Where possible, each facility was located on a map using the physical street address of the facility. However, in many cases (approximately 50 facilities), a physical street address was not available. In these cases the facilities were located by their zip code, and the location provided will only be approximate within the zip code area. The location of each facility on the maps is indicated by the pushpin symbol. Due to space limitations, the facility names could not be included on the maps.

US Shipyard Maps

Map 1: US Shipyards



Map 2: Alaskan Shipyards



Map 3: Pacific Northwest Shipyards



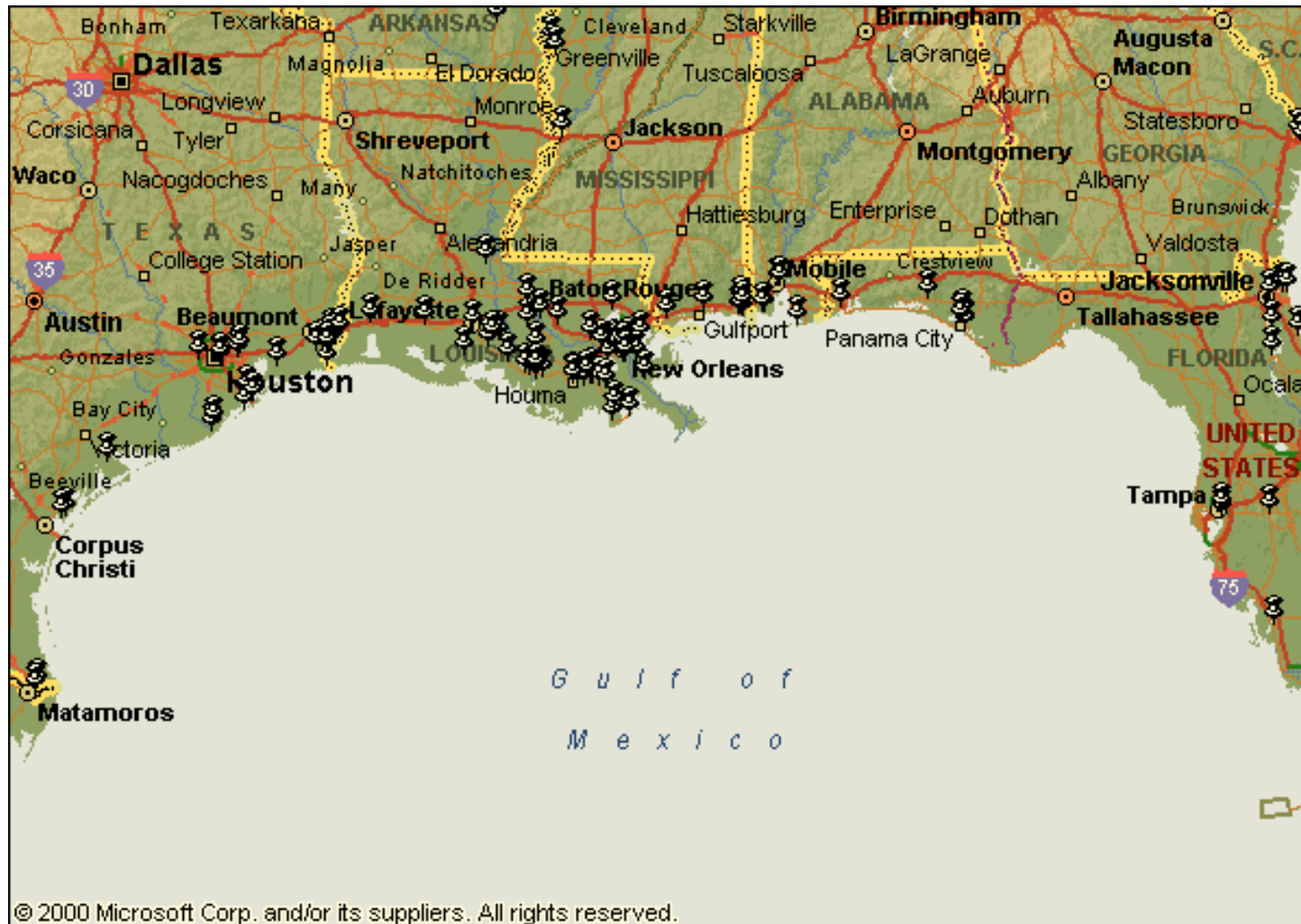
Map 4: California Shipyards



Map 5: Hawaiian Islands Shipyards



Map 6: Gulf Coast Shipyards



Map 7: Southeastern Shipyards



Map 8: Mid-Atlantic Shipyards



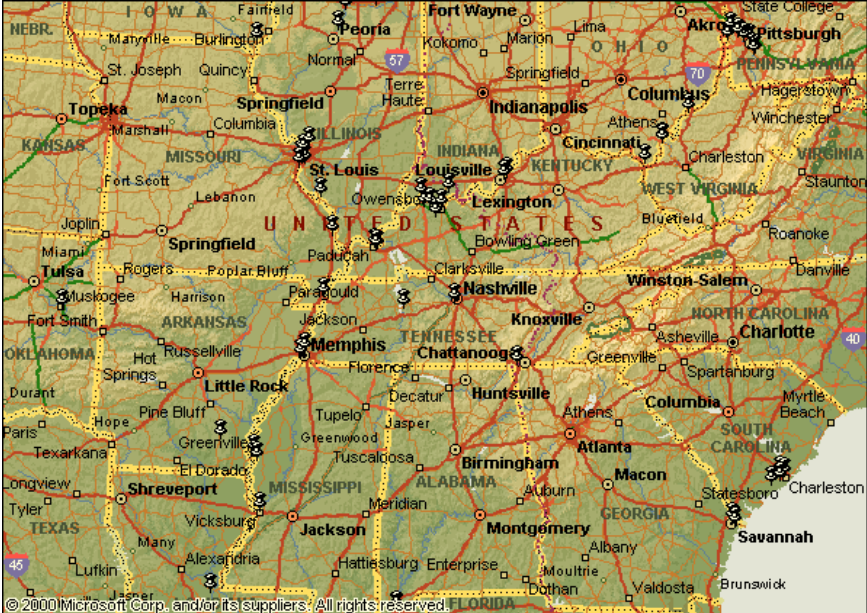
Map 9: New England Shipyards



Map 10: Great Lakes and Inland Waters Shipyards



Map 11: Inland Waters Shipyards



Task 2: Shipyard Environmental Issues of Concern Survey

Development of Survey

A survey was designed to collect information from shipyards regarding Environmental Issues of Concern. The survey (attached) consisted of three sections:

Shipyard operations and processes having potential environmental impact;

Statutory and regulatory requirements applicable to shipyards; and

Environmental compliance assistance tools that may be useful to shipyards.

The survey was designed to capture the qualitative perspective of the respondents regarding how they judged various elements of the three sections by indicating their “Level of Concern” (or “Level of Benefit” in the case of compliance assistance tools) at four levels. These levels were “None,” “Little,” “Moderate,” and “High.” Additionally, the survey respondent could indicate that a particular element was “Not Applicable” to their facility.

Section elements were designed in board subject areas to allow for the respondents to relate the element to their specific circumstances. Where possible, section elements did not make a distinction between Federal or State environmental issues.

The specific organization and content elements of the survey are provided below:

Section 1: Level of Concern regarding potential or actual environmental impacts of shipyard operations and process.

Production Operations

Dry Abrasive Blasting, Out-of-doors

Dry Abrasive Blasting, Enclosed

Solvent Cleaning

High Pressure Water Washing

Ultra High Pressure Water Jetting

Coatings Application, Out-of-doors

Coatings Application, Enclosed

Metal Welding, Cutting, Brazing

Metal Grinding

Pipefitting

Shipfitting

Sheetmetal

Forge and Foundry

Machining – Shipboard

Machining – Shop

Pump and Turbine

Tank Testing
Carpentry and Woodworking
Insulation Removal and Installation
Asbestos Removal
Air Conditioning and Refrigeration Systems
Coppersmithing
Electroplating
Electrical

Facility Operations

Ship Docking
Ship Drydocking
Ship Launching
Crane and Rigging Services
Staging
Transportation
Electrical Power Generation
Compressed Air
Steam Generation
Facility Maintenance
Housekeeping
Hazardous Materials Management
Waste Management
Hazardous Waste Management

Section 2: Level of Concern with meeting existing statutory and regulatory requirements.

Water

Waste Water Discharges to POTW
Waste Water Discharges to Surface Waters
Storm Water Discharges
On-Site Waste Water Treatment
On-Site Drinking Water
Ship's Discharges to Surface Waters
NPDES Permitting-Point Sources
NPDES Permitting-Stormwater

Dredge and Fill

Oil Discharges

Air

New Source Review

Prevention of Significant Deterioration

Title V Permits

Shipyard NESHAP/MACT

Accidental Release Prevention (Title

Air Toxic Emissions

Particulate Emissions

VOC Emissions

Motor Vehicle Emissions

Acid Rain

Ozone Depletion (CFC)

Waste

Solid Waste Management

Hazardous Waste Management

Special Wastes (such as spend abrasive)

On-Site Reuse/Recycling

Off-Site Reuse/Recycling

On-Site Waste Treatment

Used Oil

Hazardous Materials

Underground Storage Tanks

Above Ground Storage Tanks

Hazardous Materials Transportation

Worker-Right-To-Know

Lead Abatement

Asbestos Abatement

PCB

Emergency Planning

- SARA Title III
- Oil Spill Contingency Planning
- Hazardous Material Spills

Section 3: Level of Benefit of Potential Compliance Assistance Tools.

Agency Tools

- Point of Contact for Shipyard Permitting
- Agency Shipyard Representative
- Shipyard Specific Guideline Documents
- Compliance Assurance Inspections
- Agency Training for Shipyard Personnel
- Shipyard Training Agency Personnel
- Annual Agency/Shipyard Conference
- Agency Provided Consulting

Industry Tools

- Shipyard-to-Shipyard Mentoring Program
- Shipyard Developed Training Programs
- Shipyard Resource Sharing
- National Shipyard Environmental Conference
- Regional Shipyard Environmental Conference
- Industry Prepared Guidance Documents
- Industry Point of Contact for Environment Issues

This survey structure and content provided an organizational basis for the respondent to mentally review their facility's environmental issues while completing the requested information. In this manner, it was hoped that a fairly comprehensive overview of the issues for each facility issues could be determined.

Survey Distribution and Returns

Using the shipyard communication methodology described in Task 1, the survey form, and an explanatory cover page, were faxed to approximately 350 shipyards in the United States. This effort required about 20 hours of continuous operations to complete. Senior management personnel at each shipyard were targeted to receive the survey, with a request that they forward

the survey to their facility’s environmentally most knowledgeable person. The respondent was requested to “Fax-Back” after completion.

Of the 350 survey forms distributed, 44 completed surveys were returned. This represents a return rate of 13%. We consider this return rate to be fairly high for an unsolicited survey that required some effort to complete.

Surveys were received from the following geographical areas:

Table 2: Survey Summary

Region	No. of Surveys Received	Comments
California	4	Shipyards located in California
Gulf Coast	13	Shipyards located on the coast of Texas, Louisiana, Mississippi, Alabama, and the west coast of Florida.
Great Lakes & Inland Rivers	5	Shipyards located on the Great Lakes or Inland Rivers.
New England & Mid-Atlantic	8	Shipyards located in the Atlantic Coastal States from Maine to Virginia.
Southeastern	3	Shipyards located in North Carolina, South Carolina, Georgia and east coast of Florida.
Pacific Northwest	11	Shipyards located in Oregon, Washington and Alaska.
Total Surveys Received:		44

Survey Results and Analysis

The survey results were tabulated in an Access database for processing and analysis. Survey results were entered using the qualitative descriptor used in the survey, i.e., “None,” and “Little,” “Moderate,” “High” and “Not Applicable.” The qualitative descriptors were then converted to numerical values to allow for statistical analysis of the results, according to the following table:

Qualitative Descriptor	Numeric Value
None	0
Little	1
Moderate	2
High	3
Not Applicable	Null

After conversion of the responses to a numeric format, an average value (National Average) was calculated for each element. The average values were evaluated using following format:

Value ranges between 0 and 0.5 = No Concern or Benefit

Value ranges between 0.5 and 1.5 = Low Level of Concern or Benefit

Value ranges between 1.5 and 2.5 = Moderate Level of Concern or Benefit

Value ranges between 2.5 and 3.0 = High Level of Concern or Benefit

National Averages Results

The National Averages results are presented below for each of the survey sections and elements:

Table 3: National Averages

SHIPYARD OPERATIONS AND PROCESS	
<i>Production Operations</i>	<i>Level of Concern</i>
Dry Abrasive Blasting, Out of Doors	2.1
Dry Abrasive Blasting, Enclosed	1.4
Solvent Cleaning	1.5
High Pressure Water Washing	2.0
Ultra High Pressure Water Jetting	1.6
Coating Application, Out of Doors	2.2
Coating Application, Enclosed	1.7
Metal Welding, Cutting, Brazing	1.9
Metal Grinding	1.6
Pipefitting	1.3
Shipfitting	1.4
Sheetmetal	1.0

Forge and Foundry	0
Machining - Shipboard	0.9
Machining - Shop	1.3
Pump and Turbine	0.9
Tank Testing	1.4
Carpentry and Woodworking	1.1
Insulation Removal and Installation	1.7
Asbestos Removal	1.8
Air Conditioning	1.2
Coppersmithing	0
Electroplating	0
Electrical	1.1
<i>Facility Operations</i>	<i>Level of Concern</i>
Shipdocking	1.2
Drydocking	1.9
Ship Launching	1.2
Crane and Rigging	1.5
Staging	1.1
Transportation	1.2
Electrical Power Generation	1.3
Compressed Air	1.3
Steam Generation	0.7
Facility Maintenance	1.8
Housekeeping	1.8
Hazardous Materials Management	2.1
Waste Management	2.2
Hazardous Waste Management	2.1

ENVIRONMENTAL COMPLIANCE	
<i>Water</i>	<i>Level of Concern</i>
Waste Water Discharges to POTW	1.7
Waste Water Discharges to Surface Water	2.0
Storm Water Discharges	1.9
On-Site Waste Water Treatment	2.0
On-Site Drinking Water	1.0
Ship's Discharges to Surface Waters	1.9
NPDES Permitting - Point Sources	1.8
NPDES Permitting - Stormwater	2.0
Dredge and Fill	2.0
Oil Discharges	1.9
<i>Air</i>	<i>Level of Concern</i>
New Source Review	1.5
Prevention of Significant Deterioration	1.6
Title V Permits	2.1
Shipyards NESHAP/MACT	2.2
Accidental Release Prevention	1.5
Air Toxic Emissions	2.0
Particulate Emissions	2.2
VOC Emissions	2.0
Motor Vehicle Emissions	1.2
Acid Rain	0.9
Ozone Depletion (CFC)	1.0
<i>Waste</i>	<i>Level of Concern</i>
Solid Waste Management	2.1
Hazardous Waste Management	2.3
Special Waste Management	2.0

On-site Reuse/Recycling	1.5
Off-Site Reuse/Recycling	1.7
On-Site Waste Treatment	1.5
Used Oil	1.9
<i>Hazardous Materials</i>	<i>Level of Concern</i>
Underground Storage Tanks	0.9
Aboveground Storage Tanks	1.8
Hazardous Materials Transportation	1.8
Worker-Right-To-Know	2.1
Lead Abatement	1.6
Asbestos Abatement	1.4
PCB	1.5
<i>Contingency Planning</i>	<i>Level of Concern</i>
SARA Title III	1.8
Oil Spill Contingency Planning	2.1
Hazardous Materials Spills	2.0

COMPLIANCE ASSISTANCE TOOLS	
<i>Agency Tools</i>	<i>Level of Benefit</i>
Point of Contact for Shipyard Permitting	2.3
Agency Shipyard Representative	2.1
Shipyard Specific Guidance Documents	2.6
Compliance Assurance Inspections	1.9
Agency Training for Shipyard Personnel	2.1
Shipyard Training for Agency Personnel	2.2
Annual Agency/Shipyard Conference	1.9
Agency Provided Consulting	2.0

<i>Industry Tools</i>	<i>Level of Benefit</i>
Shipyards to Shipyards Mentoring Program	1.7
Shipyards Developed Training Programs	2.4
Shipyards Resource Sharing	2.2
National Shipyards Environmental Conference	1.8
Regional Shipyards Environmental Conference	2.0
Industry Prepared Guidance Documents	2.4
Industry Point of Contact for Environmental Issues	2.2

The survey produced the following information with respect to shipyard operations and process that potentially impact the environment:

1. There is no Shipyard Operation or Process, Environmental Requirement or Compliance Assistance Tool that was rated “High.”
2. The shipyard production operations or processes that rated the highest Level of Concern are Marine Coating Application, Out of Doors (rated 2.2), Dry Abrasive Blasting, Out of Doors (rated 2.1), and High Pressure Water Washing (rated 2.0).
3. The shipyard facility functions that rated the highest Level of Concern were Waste Management (rated 2.2), Hazardous Materials Management and Hazardous Waste Management (both rated 2.1).

With regard to shipyard environmental requirements:

1. Those areas of environmental compliance that shipyards are most concerned with are Waste Water Discharges to Surface Waters (2.0), On-site Waste Water Treatment (2.0), NPDES Permitting, Stormwater (2.0), Dredge and Fill (2.0), Title V Permits (2.1), Shipyard NESHAP/MACT (2.2), Air Toxic Emissions (2.0), Particulate Emissions (2.2), VOC Emissions (2.0), Solid Waste Management (2.1), Hazardous Waste Management (2.3) and Special Waste Management (2.0).
2. Contingency Planning requirements remain a national concern with shipyards, with Oil Spill Contingency Planning and Hazardous Materials Spills being rated 2.1 and 2.0 respectively.

With regard to potential compliance assistance tools:

1. All potential agency supplied compliance tools scored in the Moderate range, except for Shipyard Specific Guidance Documents, with the Level of Benefit rated 2.6 (High).
2. All potential industry supplied compliance tools fell in the Moderate Level of Benefit range, with the highest rating for Shipyard Developed Training Programs and Industry Prepared Guidance Documents.

Regional Averages Results

To discern if there were significant differences between the various geographic regions of shipbuilding and repair activities in the U.S. regarding environmental issues of concern, the survey results were sorted into various regional categories (as previously discussed in this report), and the results were tabulated and charted (Attached in Appendix 1). A review of these charts identifies several important regional trends and differences in the survey responses.

With regard to shipyard operations and process that potentially impact the environment:

1. Shipyards in the Inland Rivers region generally scored their Level of Concern (or Benefit) lower than the other regions of the US.
2. Surface Preparation and Coating Application activities generally scored in the Moderate Level of Concern range for most regions.
3. Metal Welding, Cutting and Brazing also scored relatively high levels of concern in all but the Pacific Northwest region.
4. Most regions scored the metalworking and machining trades to be of low or no concern.
5. Asbestos removal activities scores were significantly higher in California, the Gulf Coast and Pacific Northwest, vs. the Inland Rivers, New England states and Southeastern states.
6. Shipyard production shop processes were mostly considered to be of low to no concern in their potential environmental impact.
7. The survey indicated that Drydocking was an issue of High to Moderate concern in all regions except the Southeastern states.
8. Facility production support services were of generally low levels of concern in most regions.
9. Facility housekeeping activities, including waste, hazardous waste and hazardous materials management scored a High to Moderate Level of Concern in all regions, except in the Inland Rivers, which rated these activities of Low Concern.

With regard to shipyard environmental requirements:

1. Meeting water quality requirements is a predominately High to Moderate concern for shipyards in all regions. Meeting the Dredge and Fill requirements was a particular concern for shipyards on the West and Gulf Coasts.
2. In the area of air quality requirements, Title V Permits and the Shipyard NESHAP/MACT were of most concern in most regions.
3. The level of concern in meeting the Particulate Emission standards were much higher in the California and the Gulf Coast regions than the other regions.
4. Meeting the waste management requirements scored in the Moderate to High range in most regions.

With regard to potential compliance assistance tools:

1. Agency prepared Shipyard Specific Guidance Documents were the compliance assistance tool most shipyards in most regions believed would be of greatest benefit.
2. Overall, all regions indicated that agency provided compliance assistance tools would be of significant benefit.
3. Industry provided compliance assistance also rated higher in most instances, scoring in the Moderate to High Level of Benefit range in all regions.

Discussion

The survey results reveal several overall trends regarding environmental issues of concern in the US Shipbuilding and Repair Industry Sector. While a number of these trends have been recognized and given voice previously, this survey provided the means to quantify and document these matters.

Out of doors surface preparation in general, and dry abrasive blasting in the specific, together with the coating application process, are believed to be the shipyard processes that have the greatest potential to impact the environment. The management of wastes, including hazardous and special wastes, is also seen as having a significant potential impact.

Metal working processes, including welding, cutting and brazing, are becoming of increasing concern regarding their potential environmental impact. Like surface preparation and coating applications, these metal working processes often must be conducted out-of-doors, where pollutant emissions are more difficult to control.

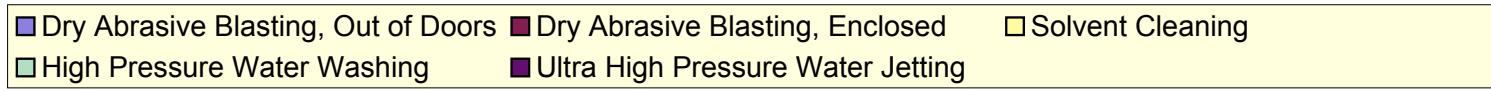
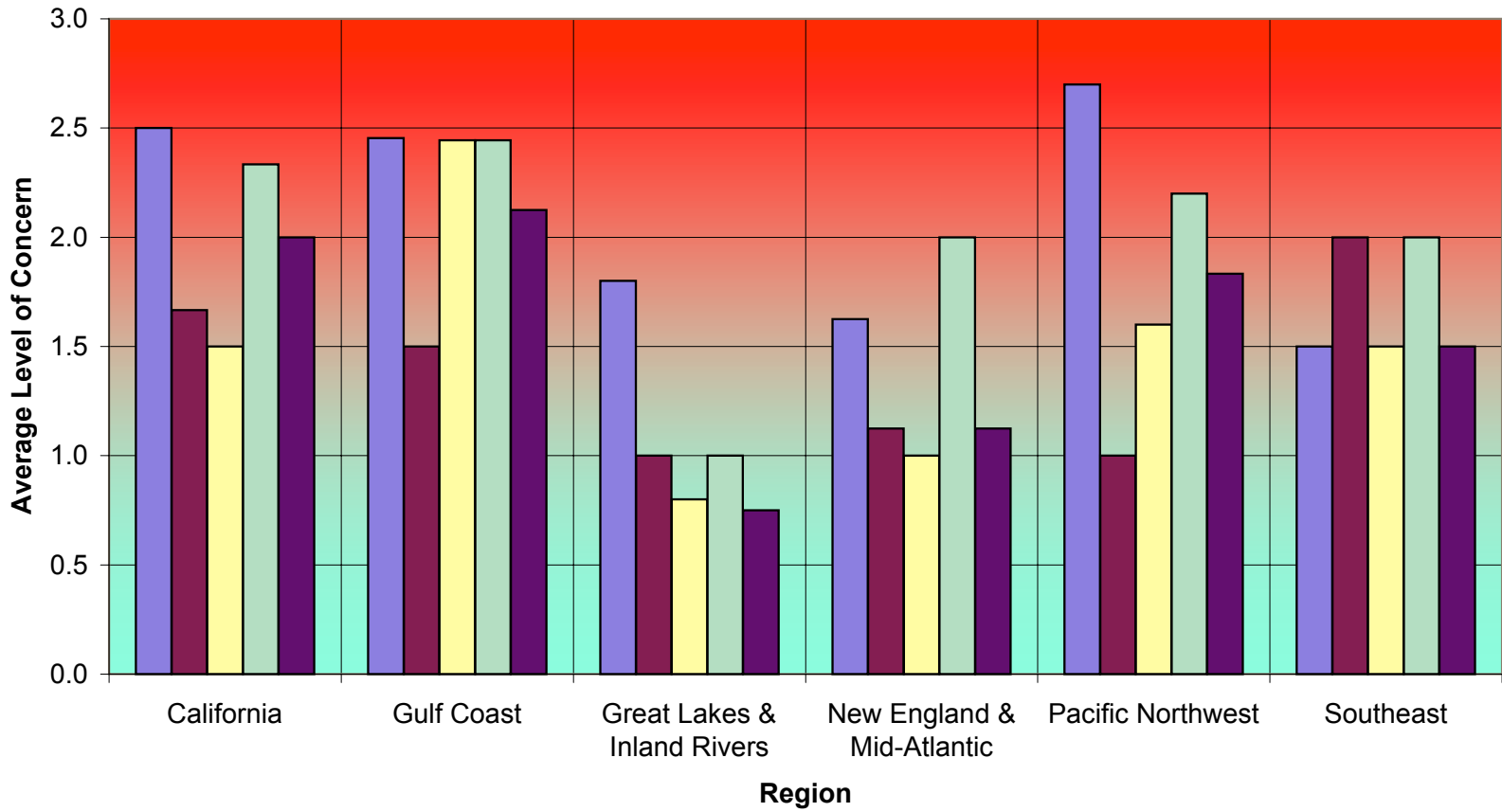
Most shipyards expressed a significant level of concern in being able to consistently meet environmental regulatory requirements. This was true for both relatively new requirements such as stormwater discharges, and old requirements, such as hazardous waste management. This appears to support the common belief by many shipyard personnel that many applicable regulatory schemes do not “fit” into how the shipyard must operate its business.

There exists some significant regional differences in the environmental concerns of shipyards. These differences are likely due to State and Regional variations in environmental program implementation and enforcement. This appears to support the claim of many shipyards that the environmental “playing field” is not level with regard to its requirements.

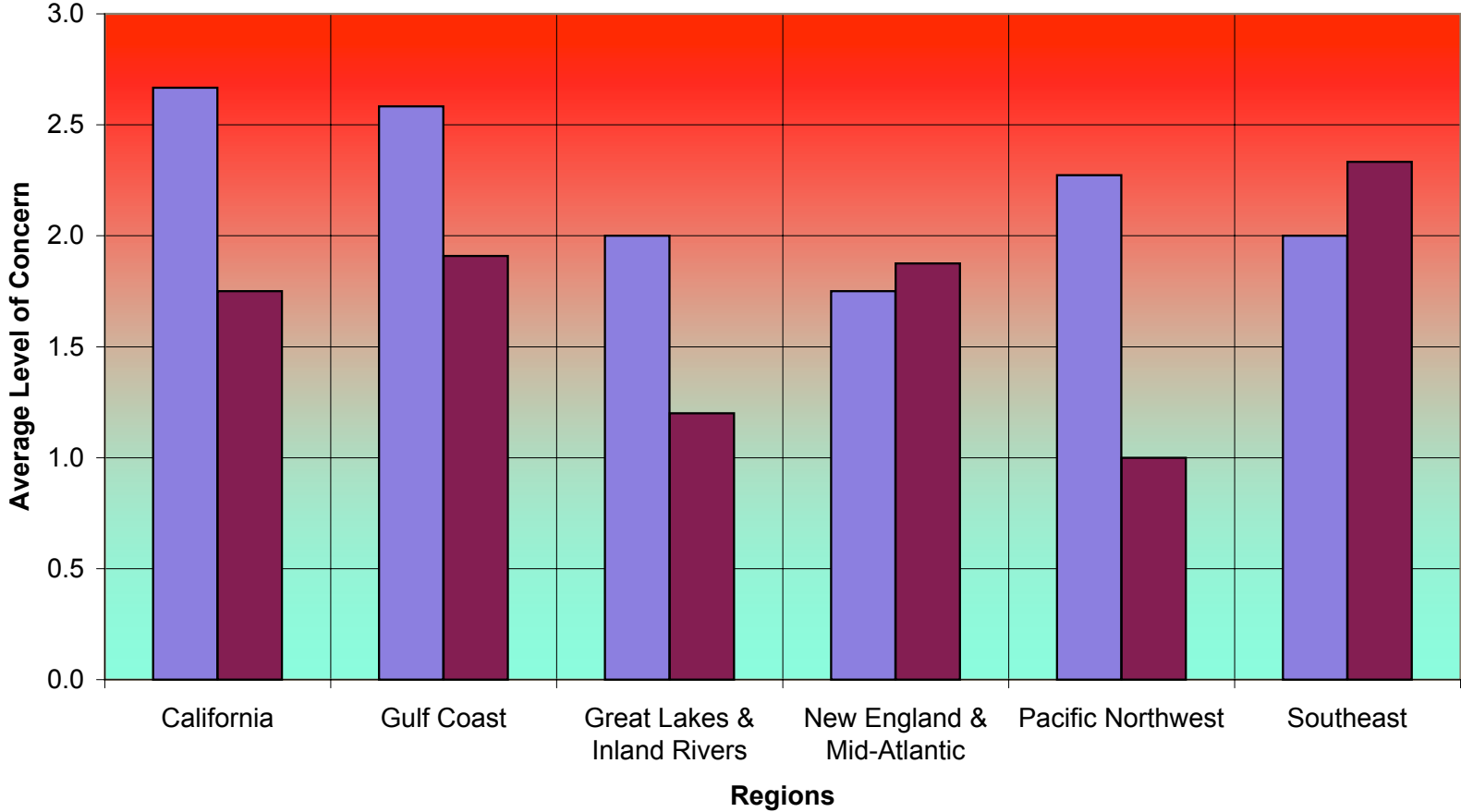
Finally, shipyards as a group believe that both agency and industry compliance assistance tools would provide some significant benefit in meeting the standards and protecting the environment.

Appendix 1

Surface Preparation

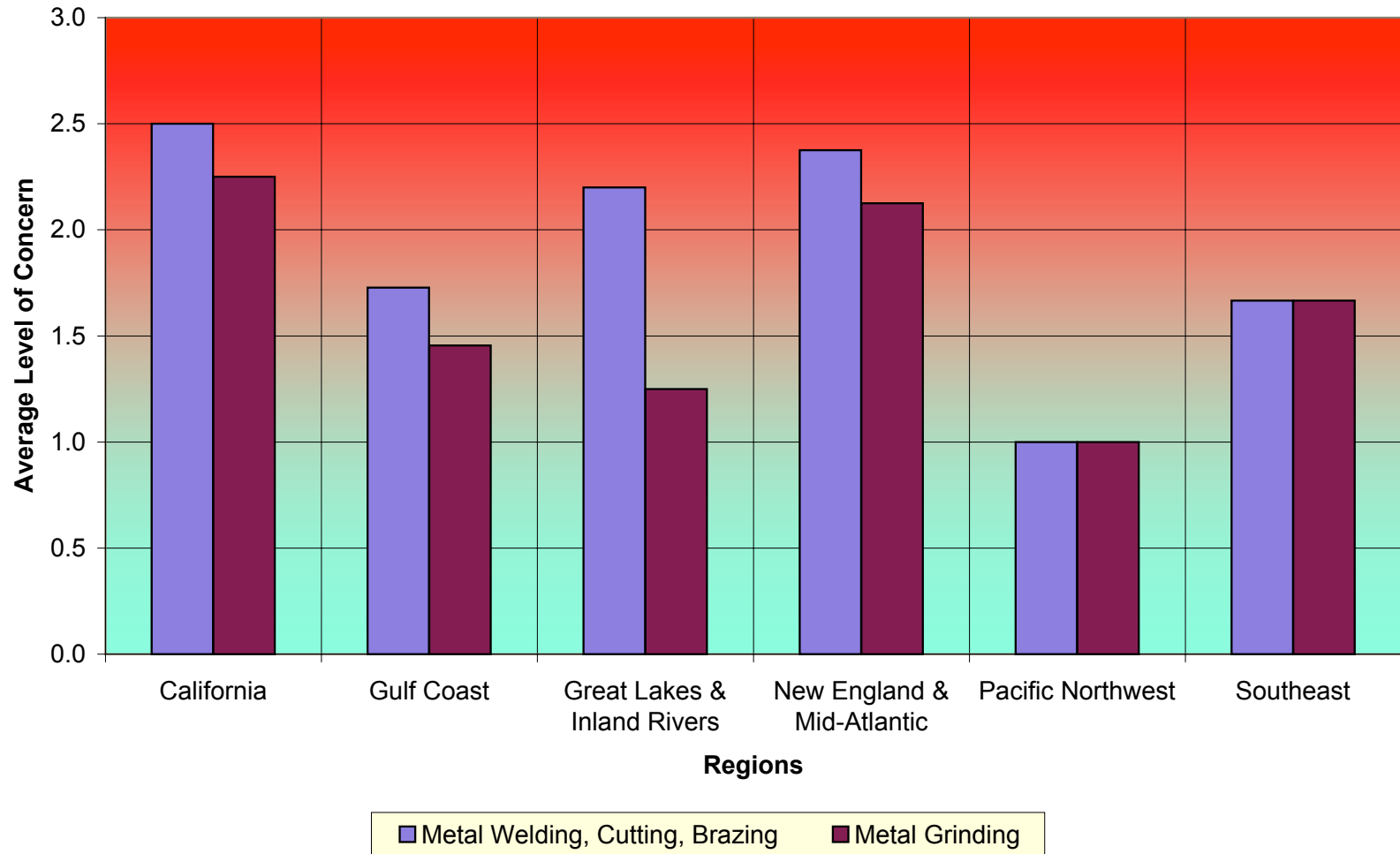


Coating Application

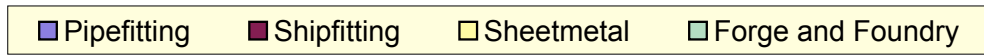
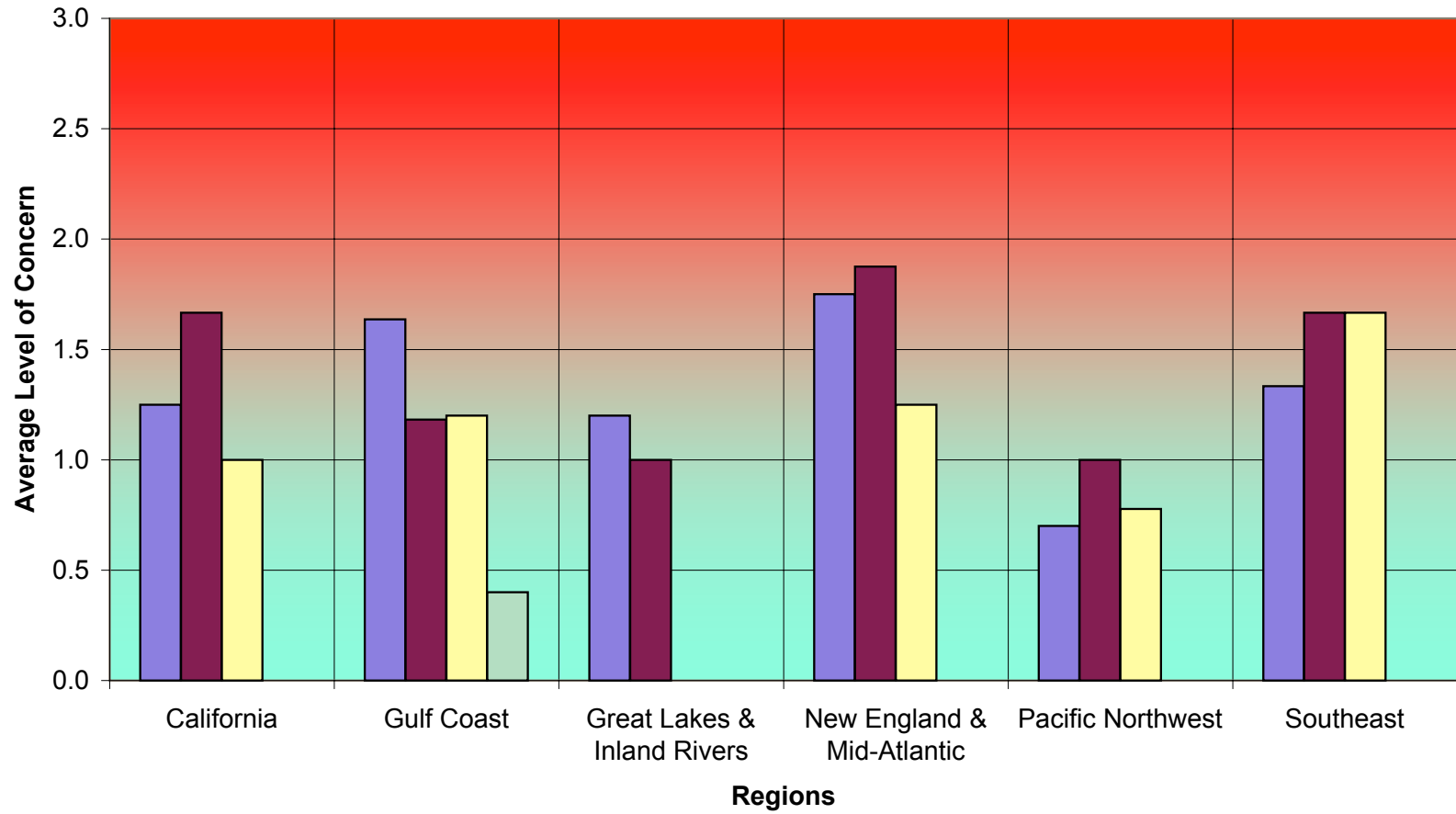


■ Coating Application, Out of Doors ■ Coating Application, Enclosed

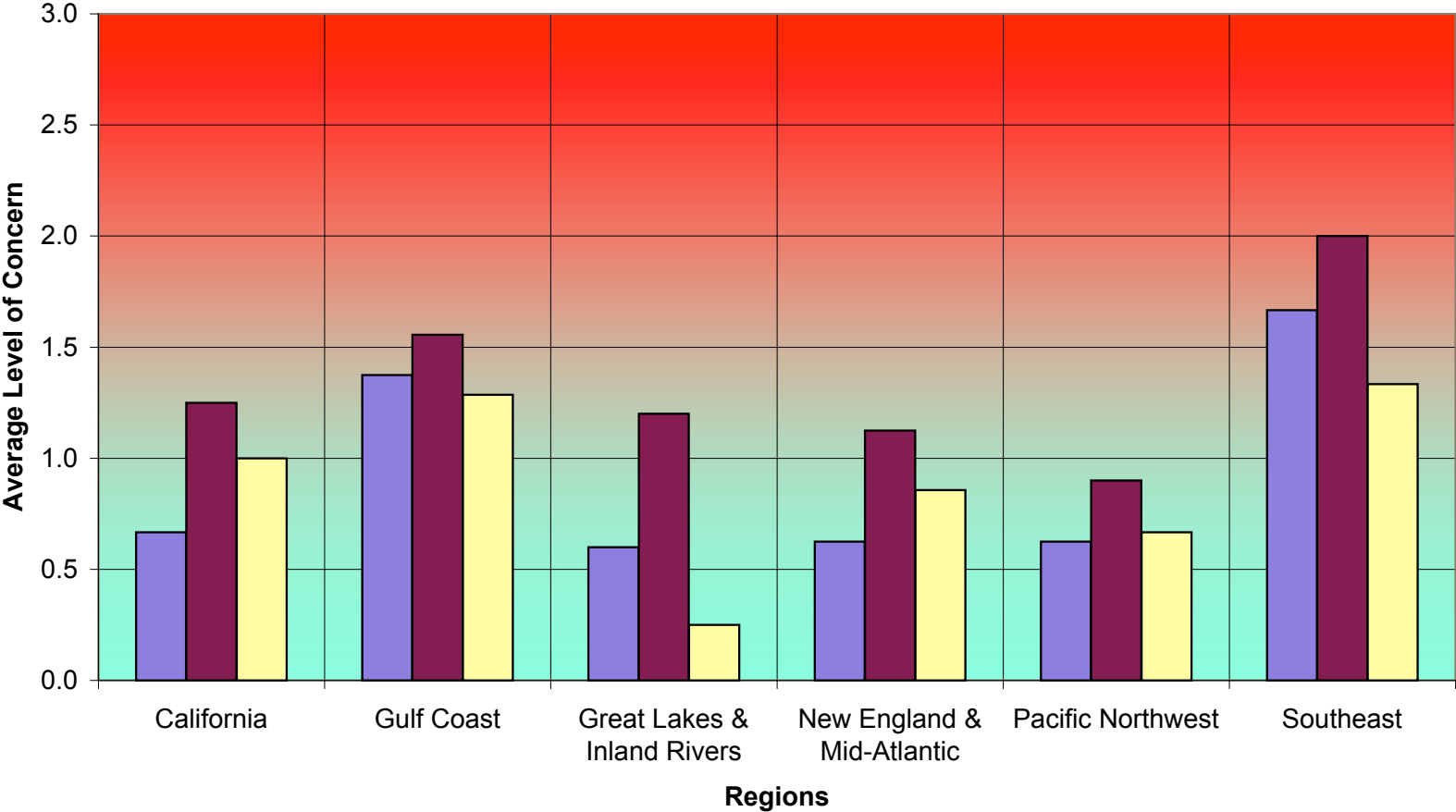
Metal Working



Metal Working

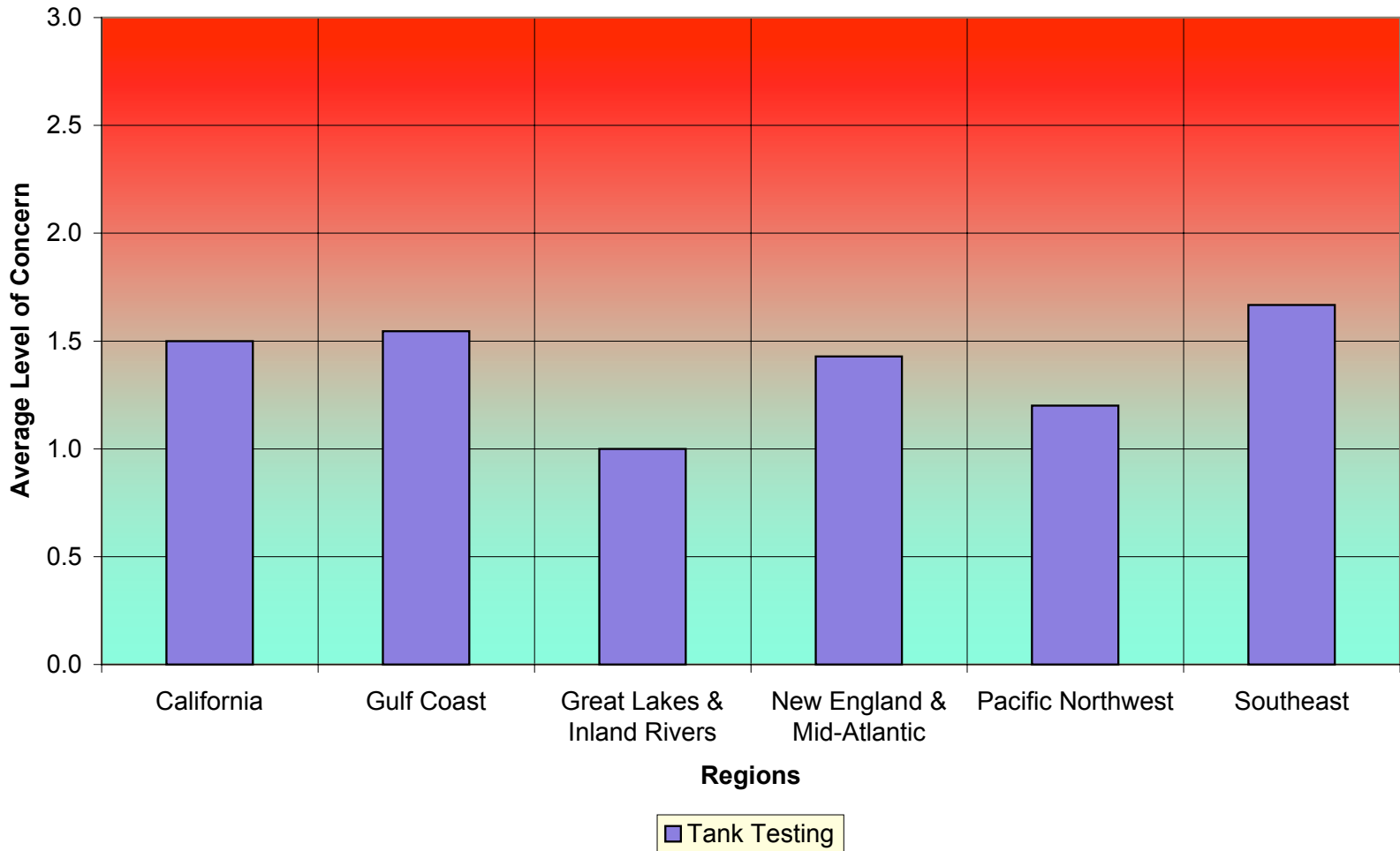


Machining

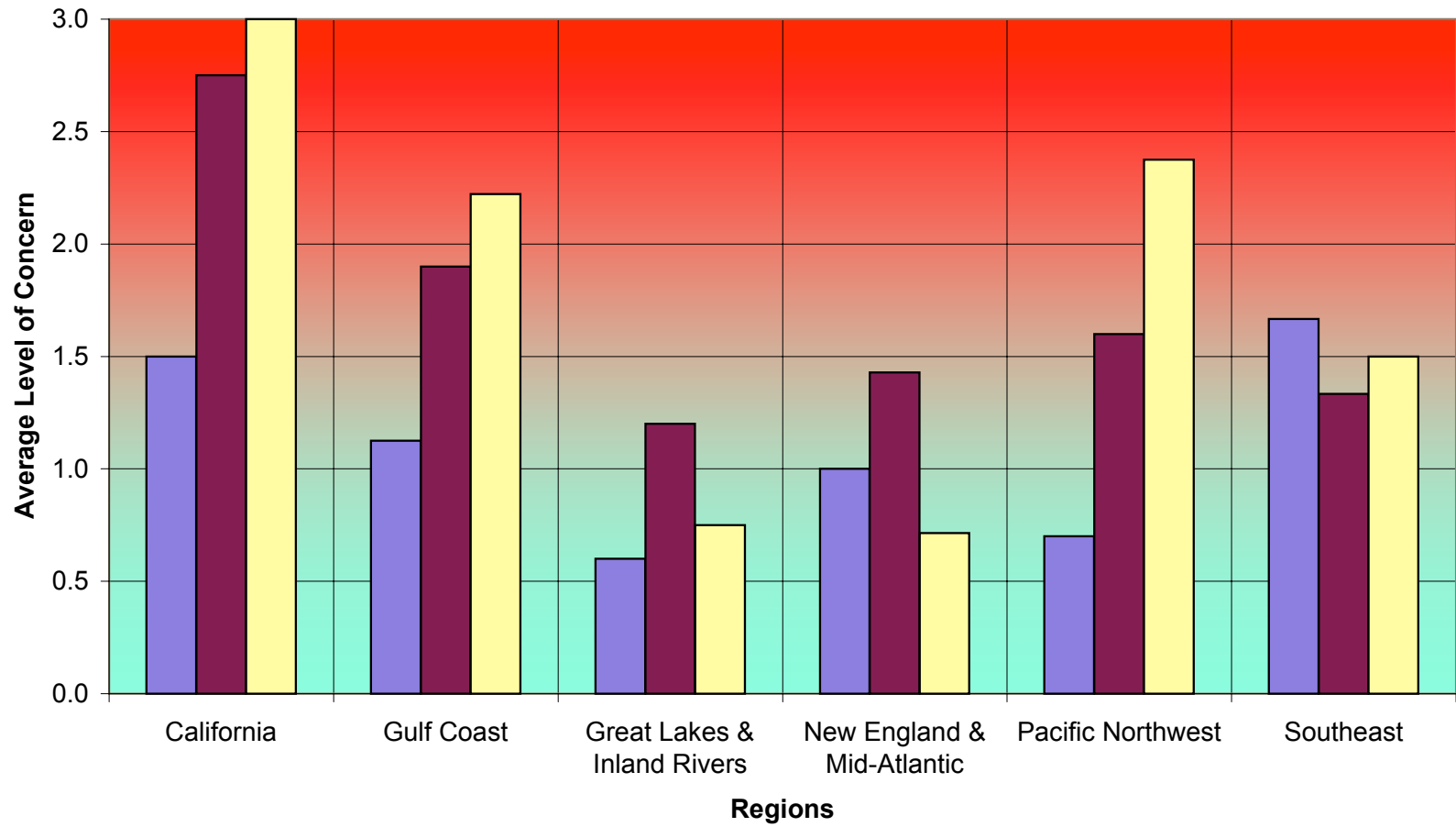


■ Machining - Shipboard ■ Machining - Shop □ Pump and Turbine

Tank Testing

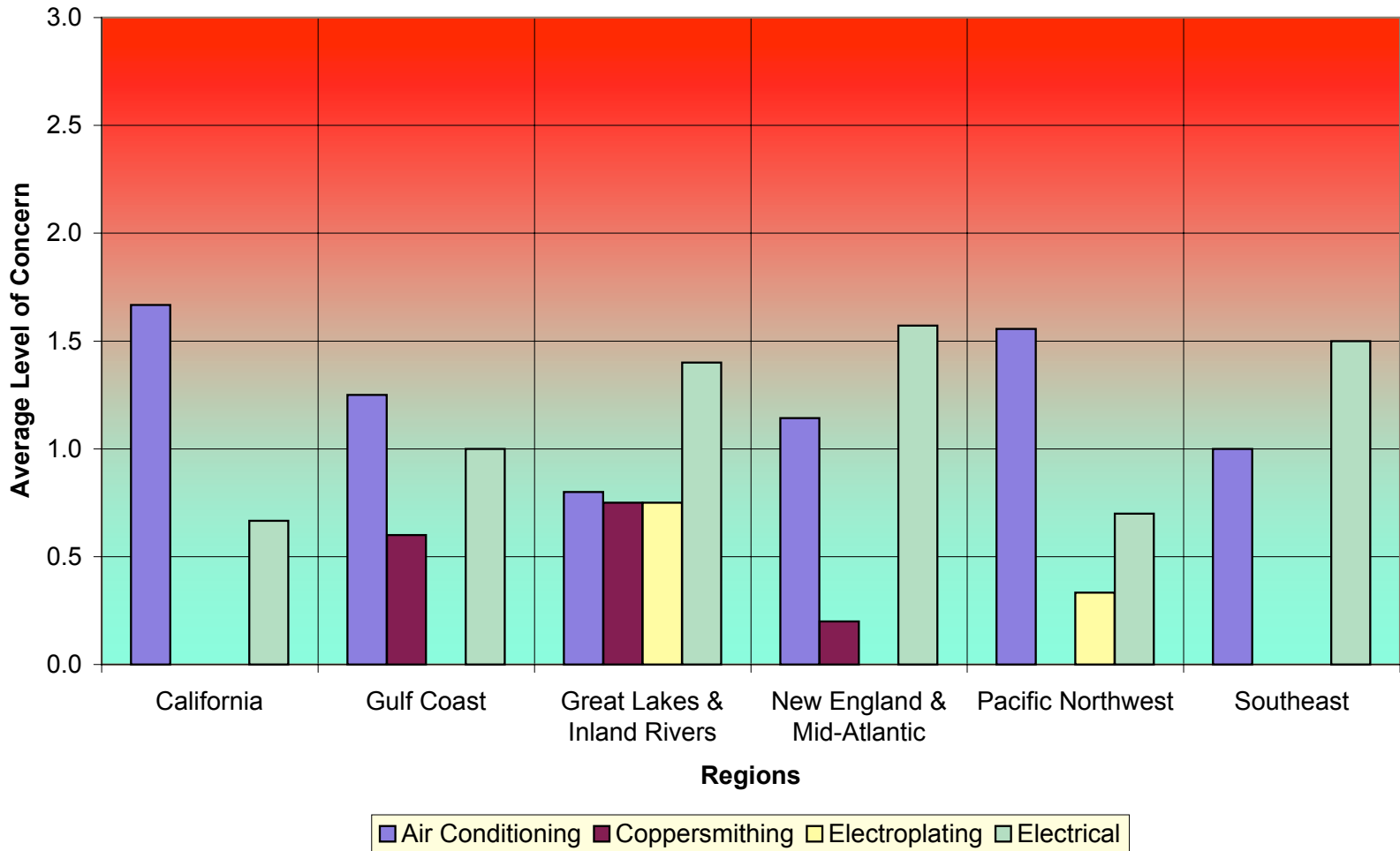


Carpentry & Insulation

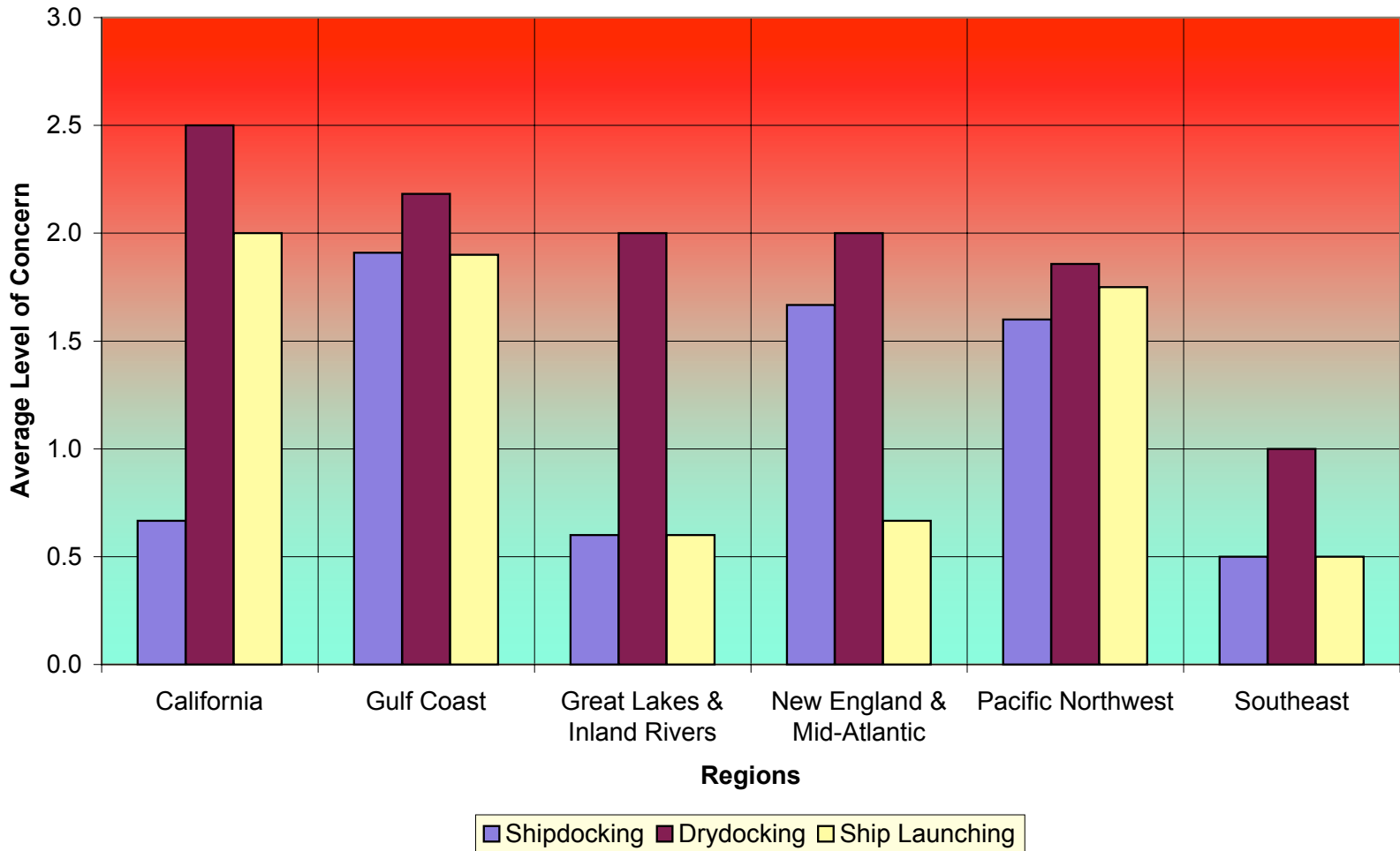


■ Carpentry and Woodworking ■ Insulation Removal and Installation ■ Asbestos Removal

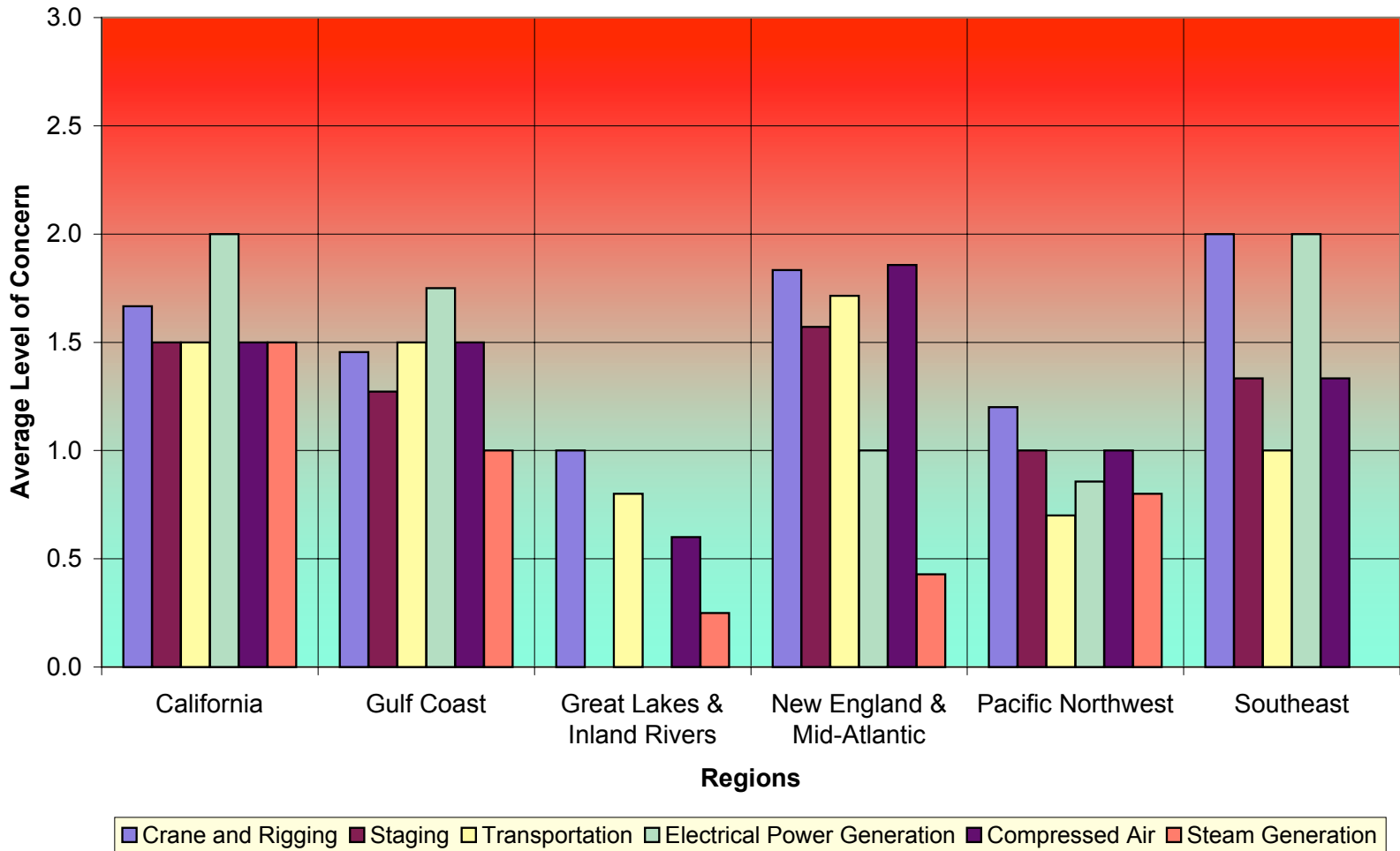
Shop Processes



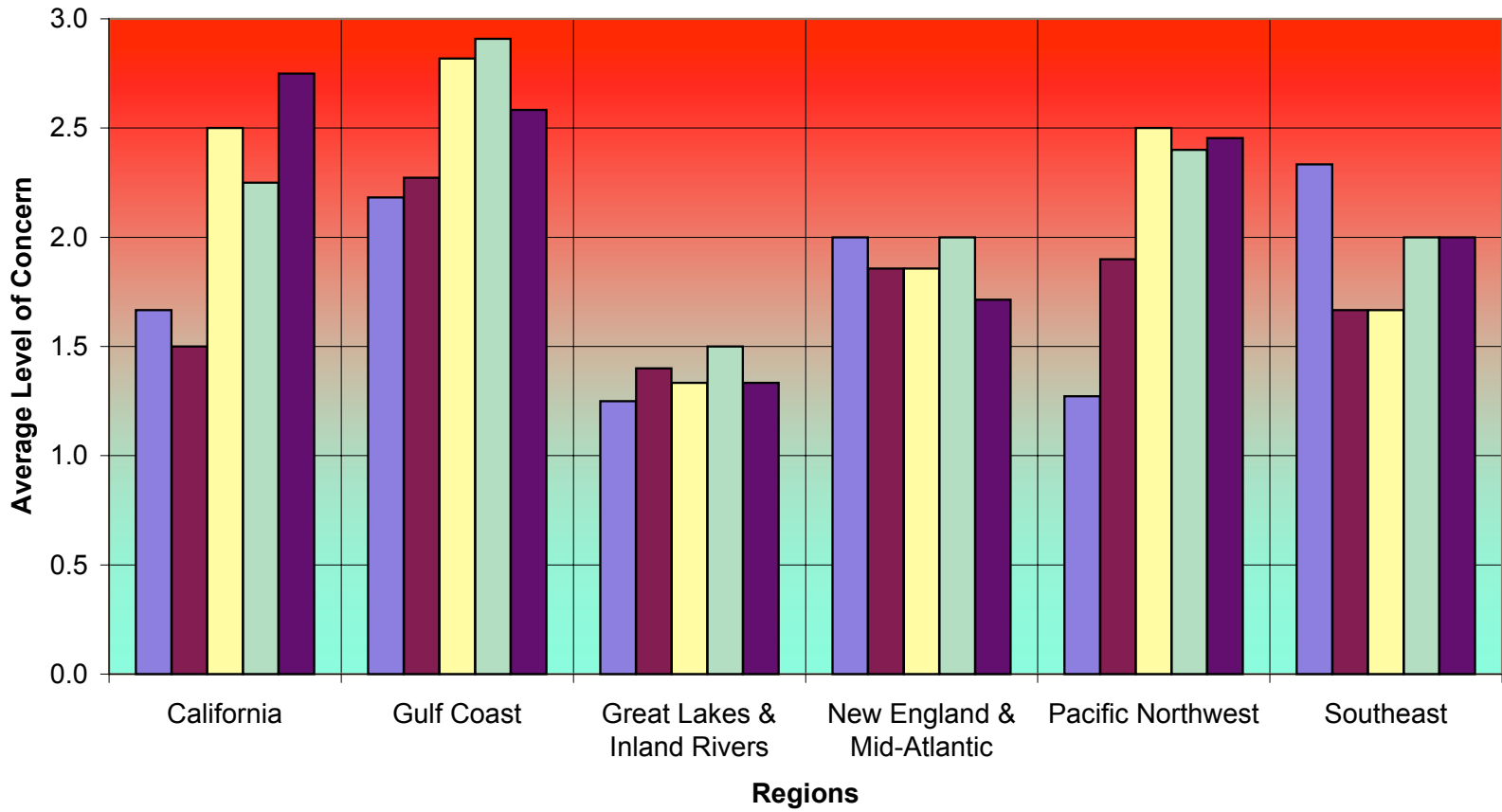
Ship Dock & Launching



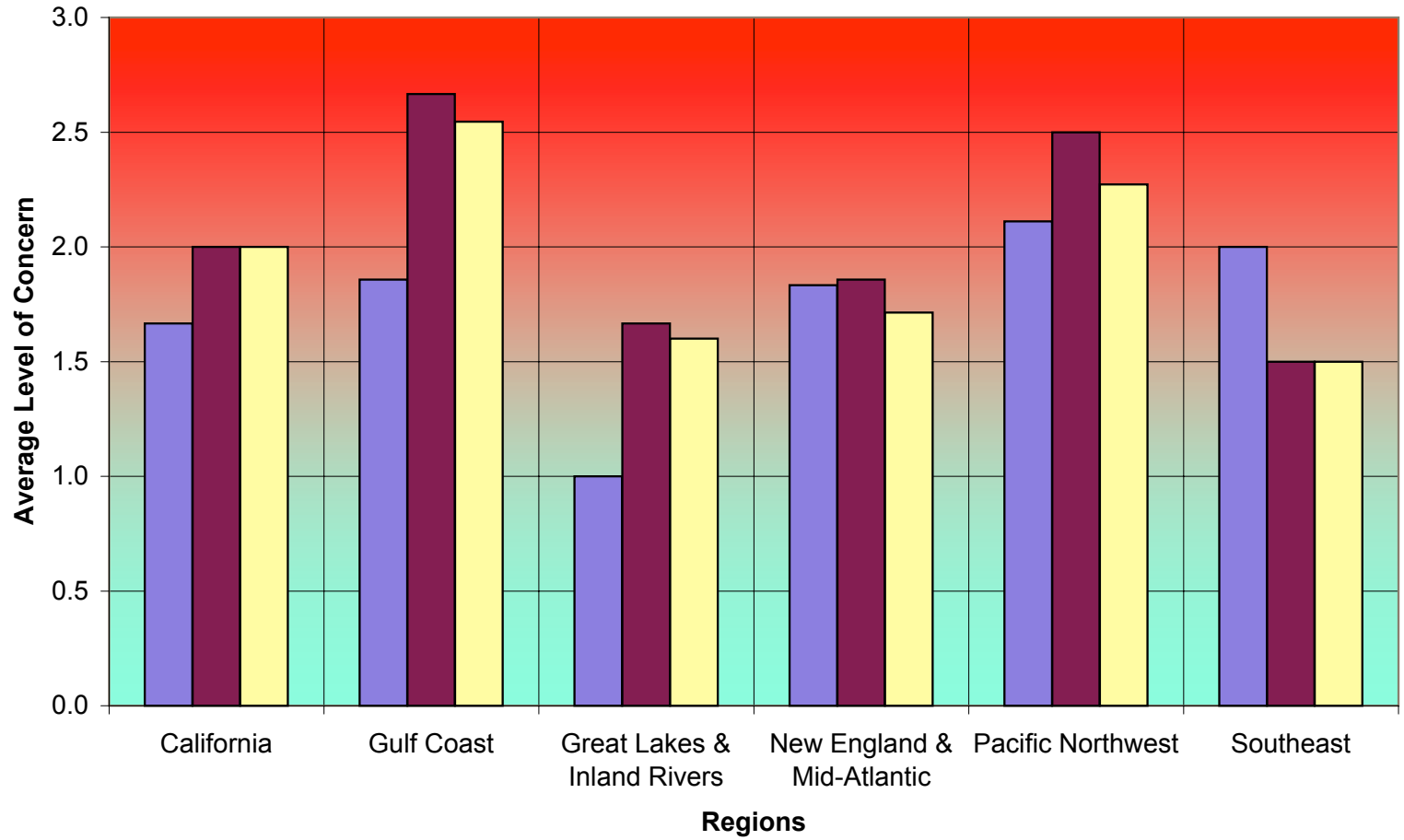
Facility Production Support Services



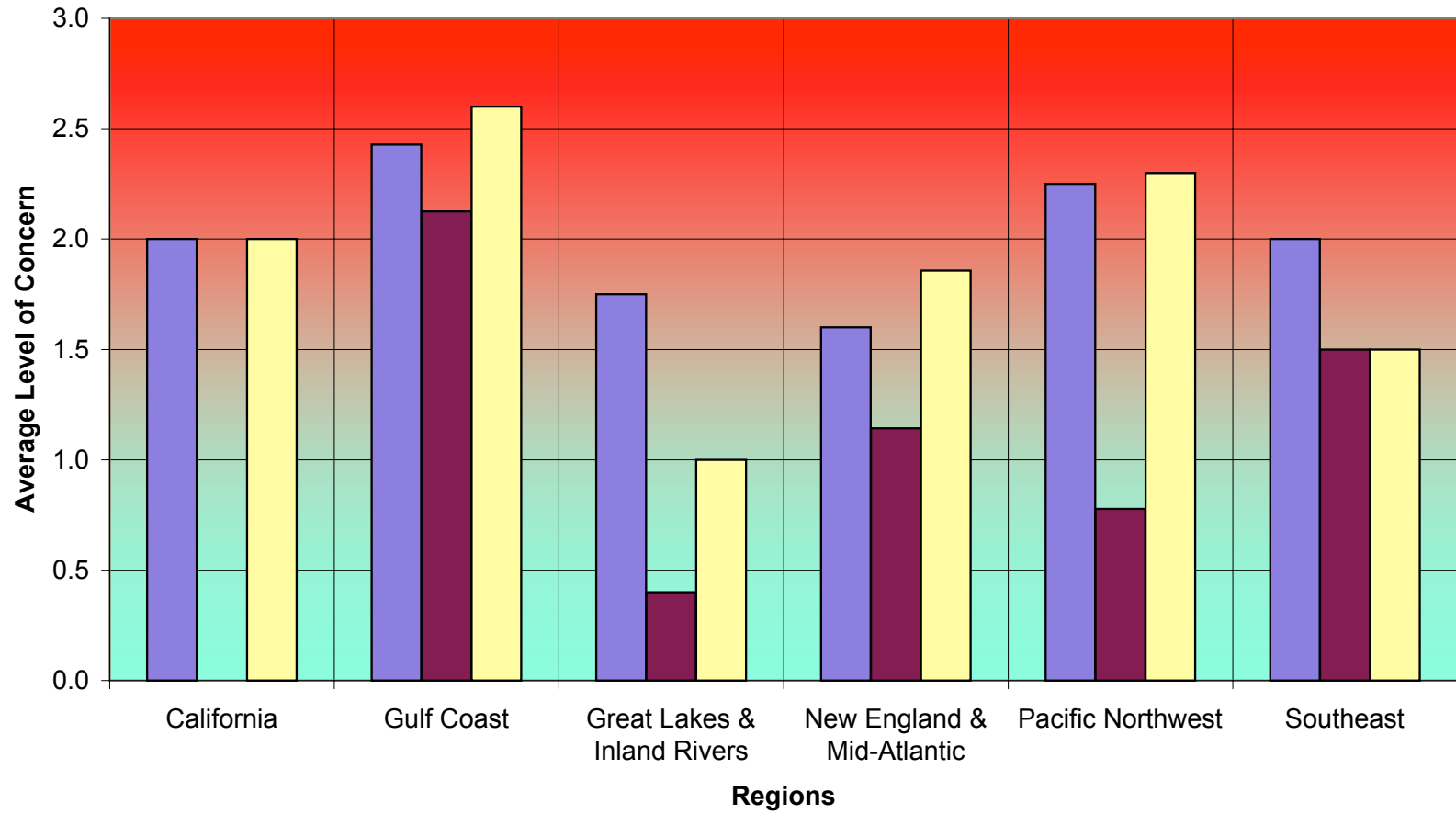
Facility Support Services



Water Quality Programs

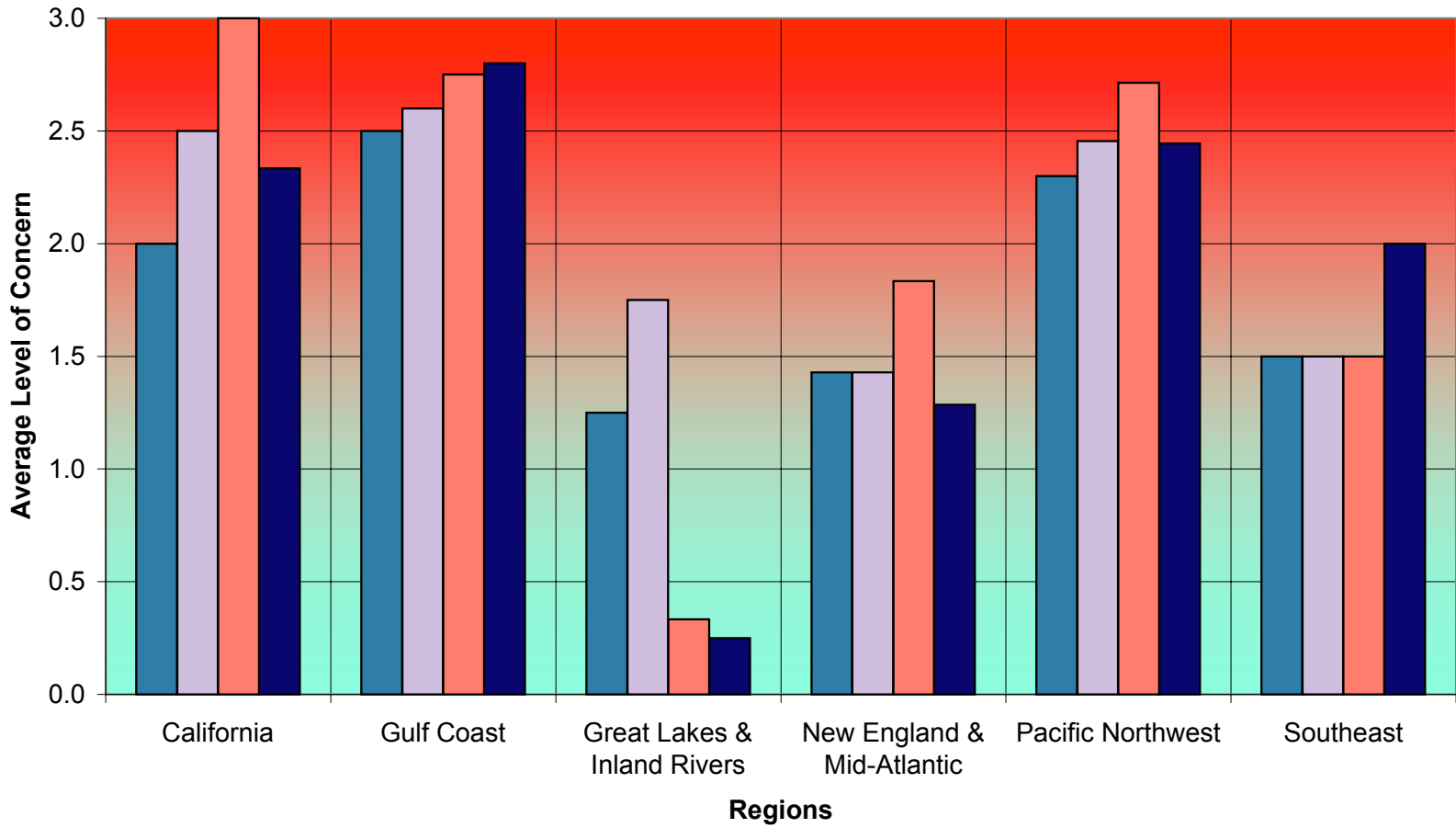


Water Quality Programs



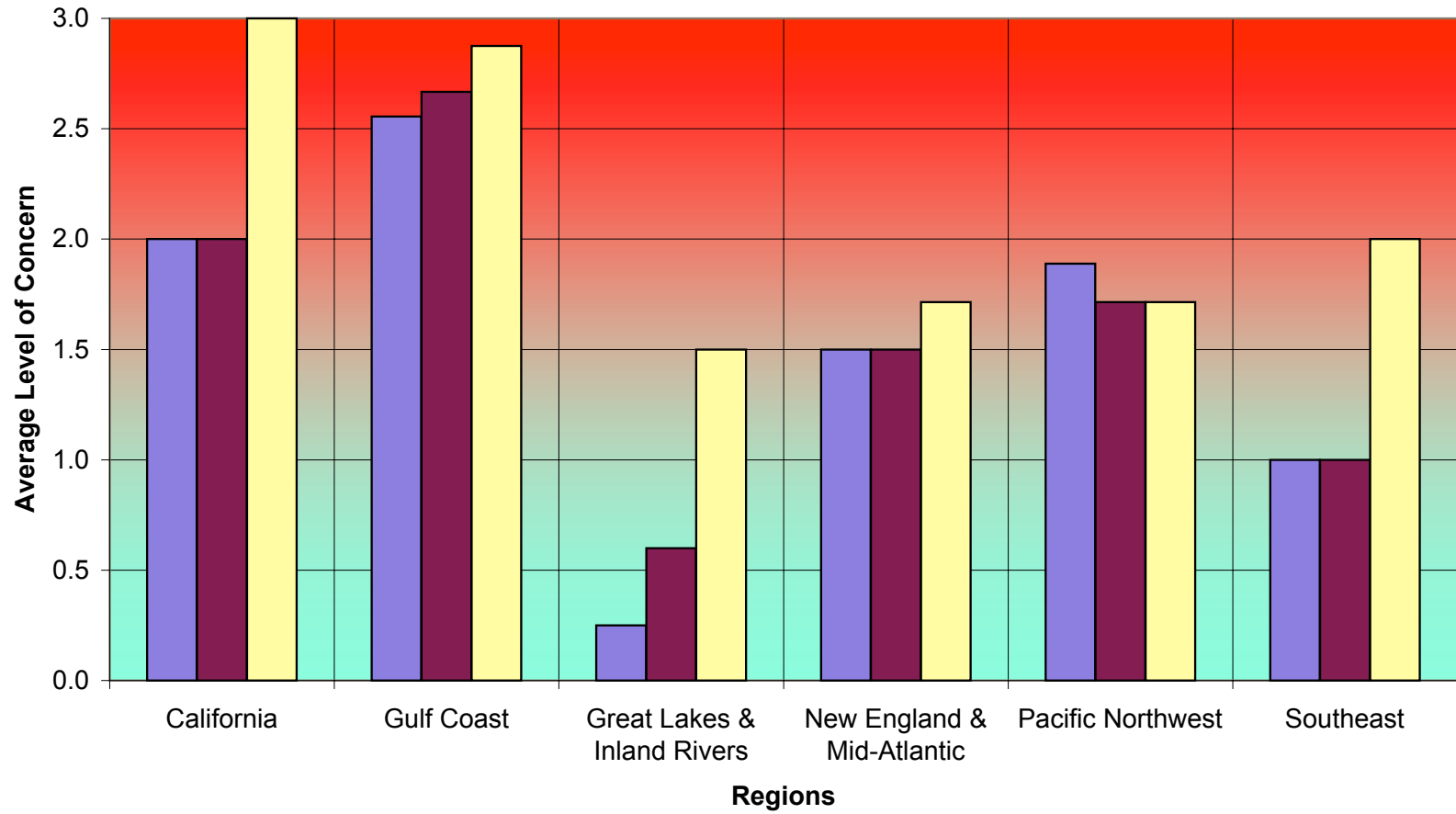
■ On-Site Waste Water Treatment ■ On-Site Drinking Water ■ Ship's Discharges to Surface Waters

Water Quality Programs



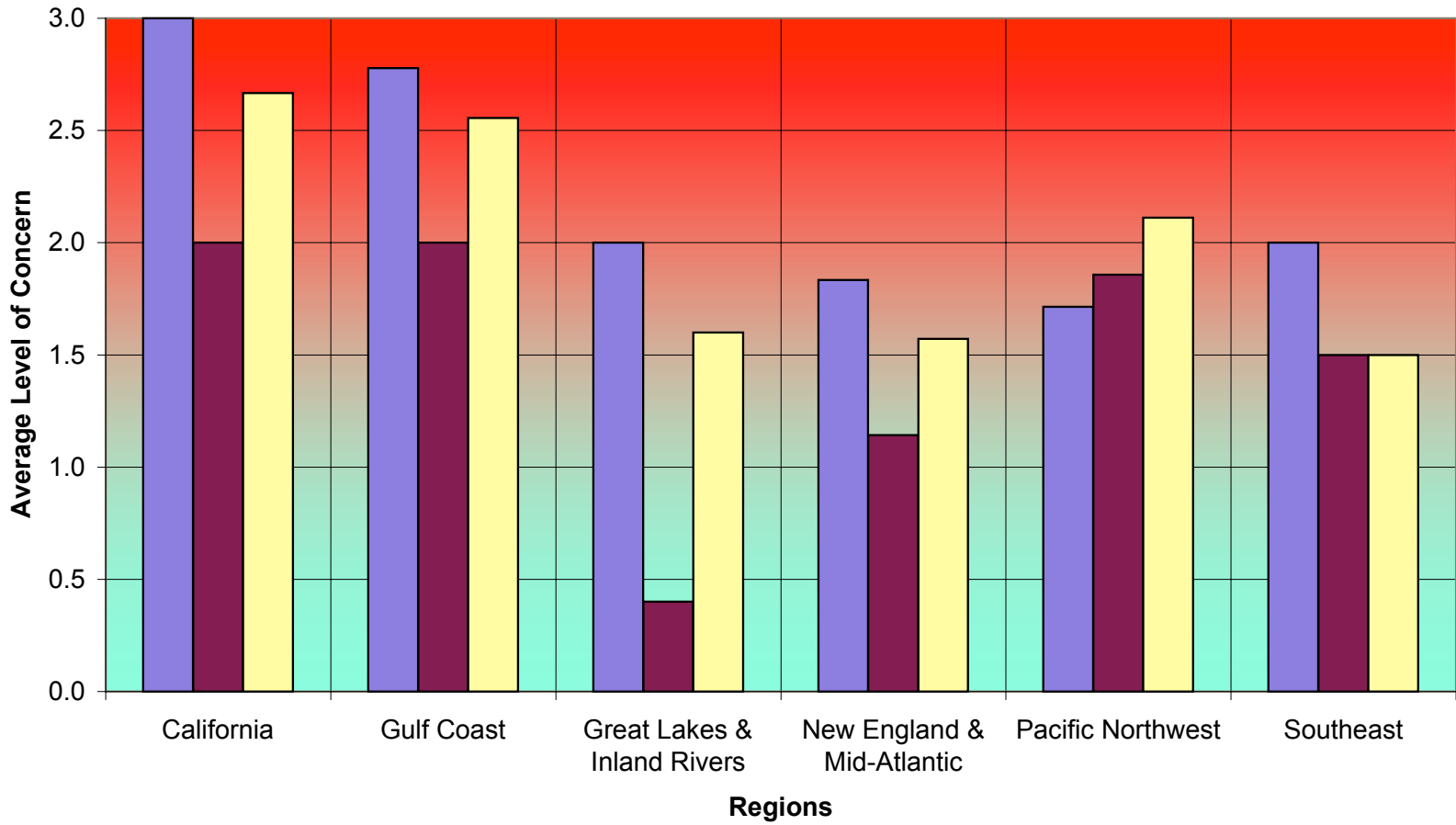
■ NPDES Permitting - Point Sources ■ NPDES Permitting - Stormwater ■ Dredge and Fill ■ Oil Discharges

Air Quality Programs



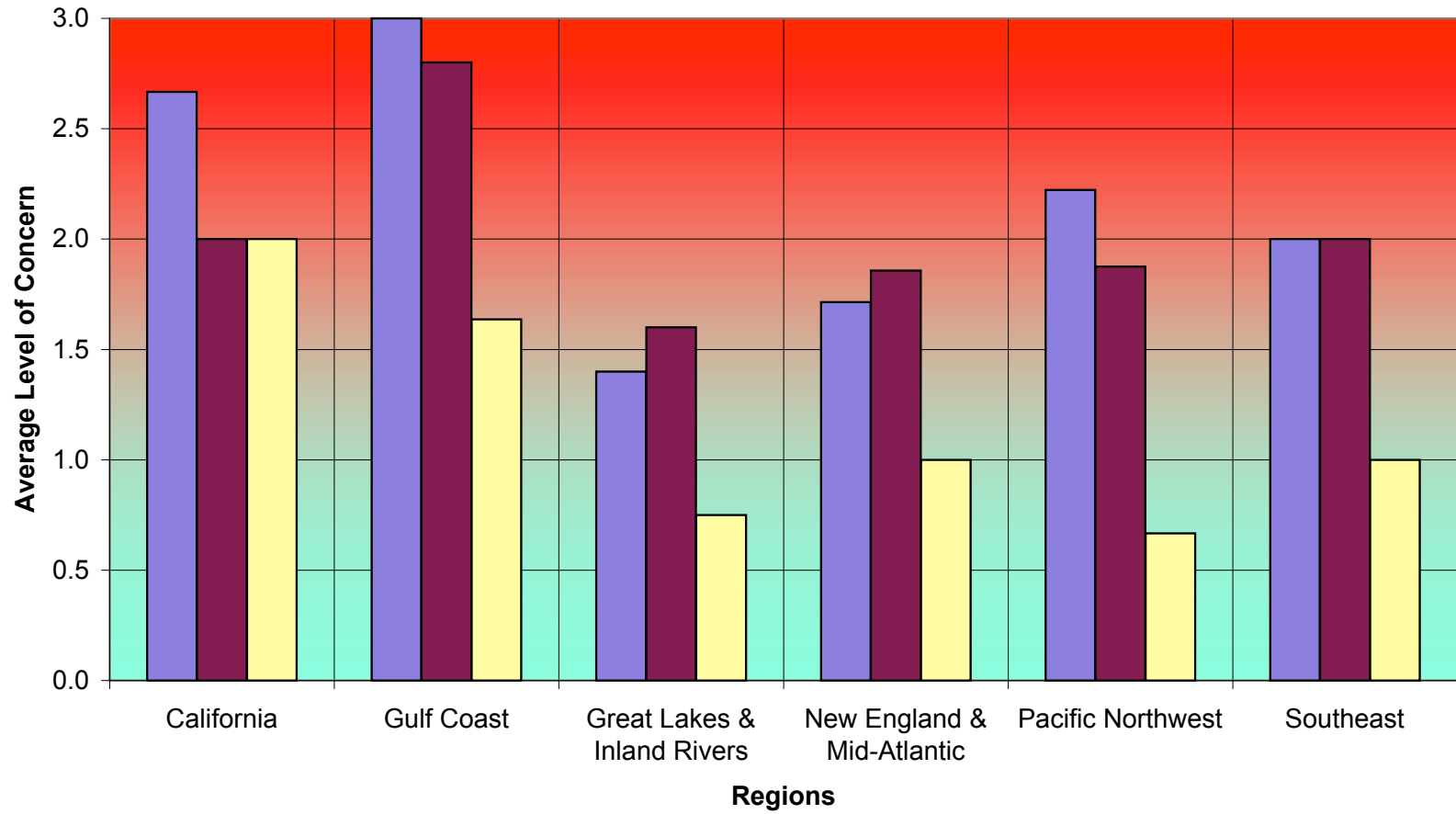
■ New Source Review ■ Prevention of Significant Deterioration □ Title V Permits

Air Quality Programs



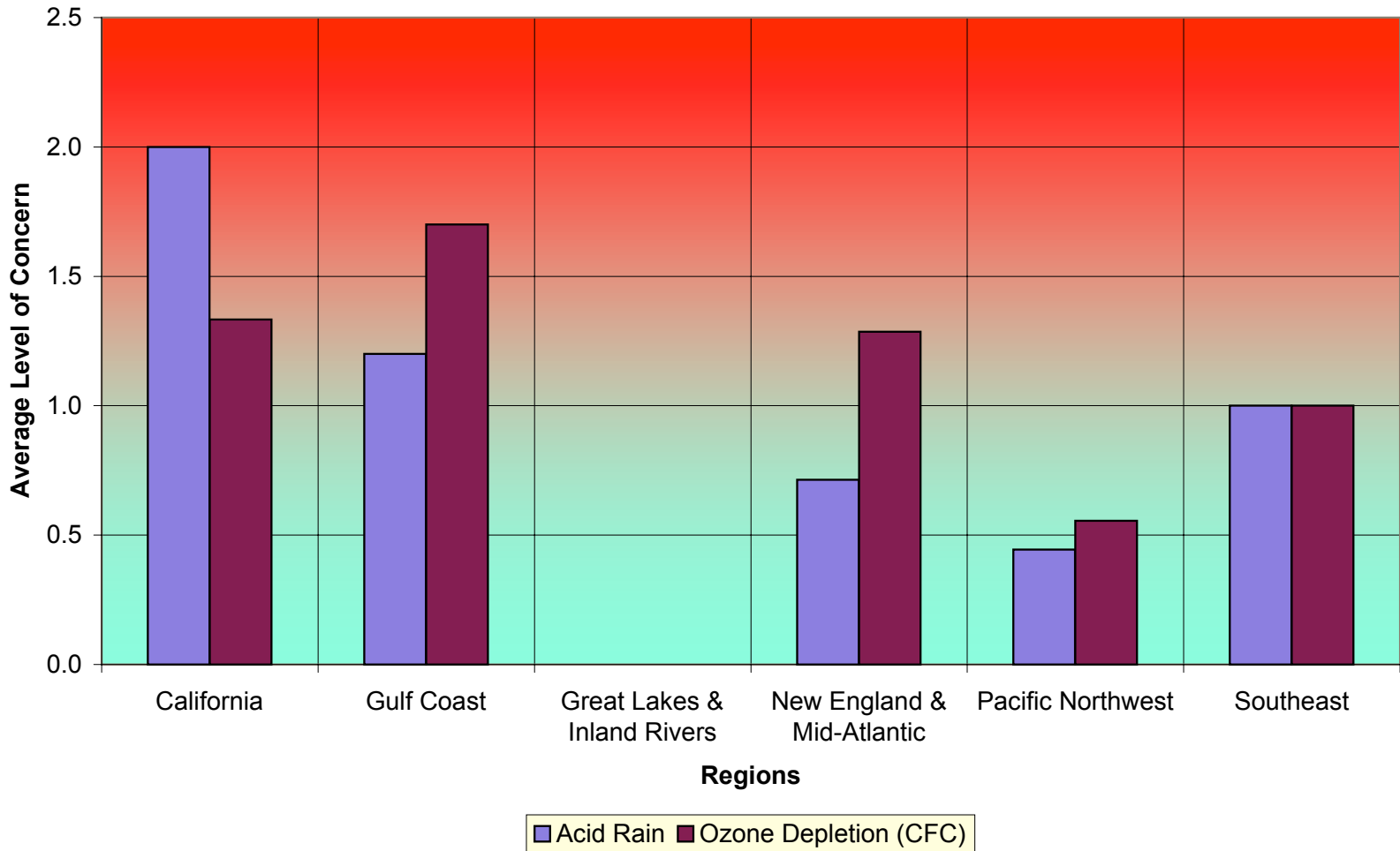
■ Shipyard NESHAP/MACT ■ Accidental Release Prevention ■ Air Toxic Emissions

Air Quality Programs

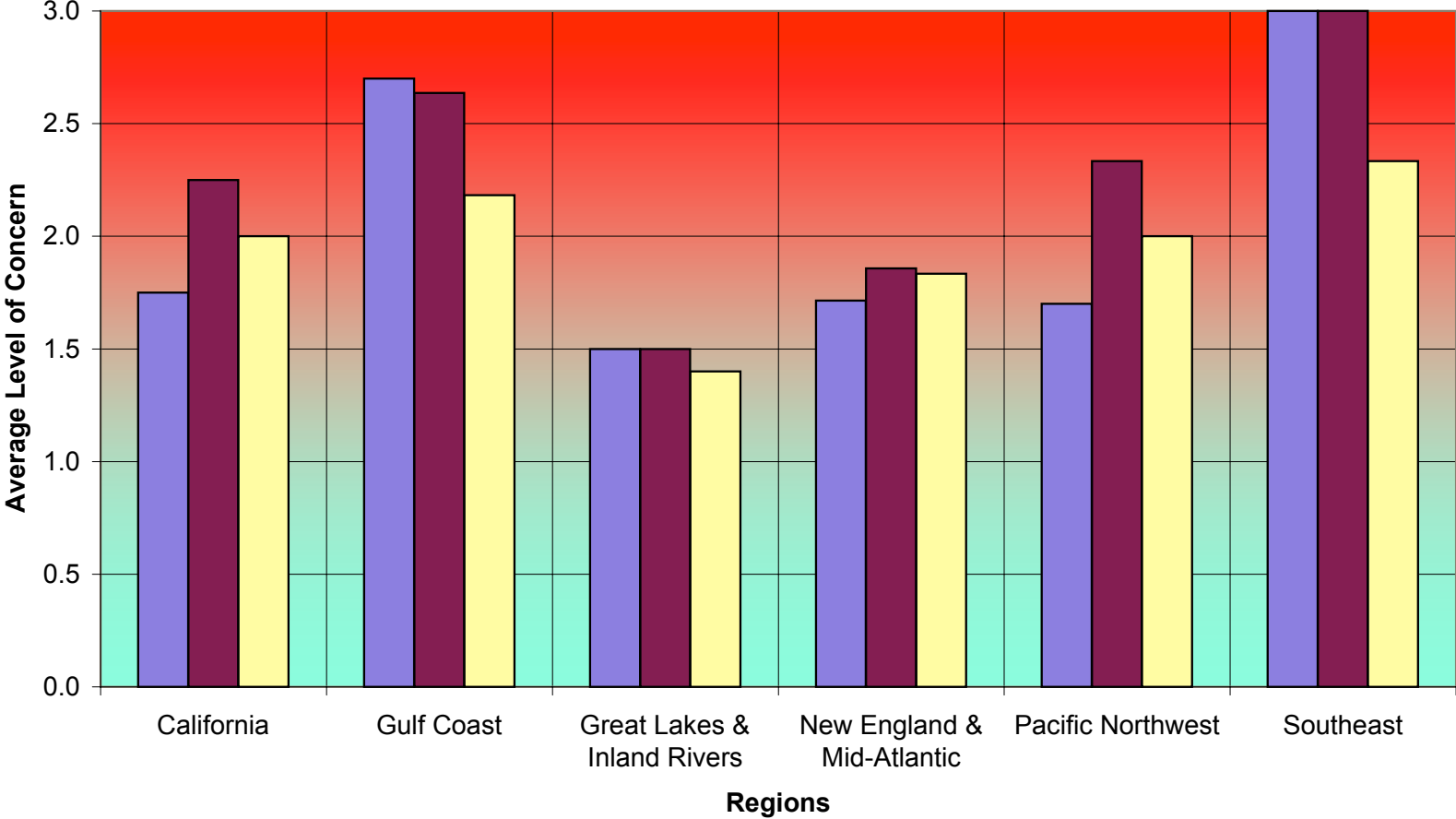


■ Particulate Emissions ■ VOC Emissions ■ Motor Vehicle Emissions

Air Quality Programs

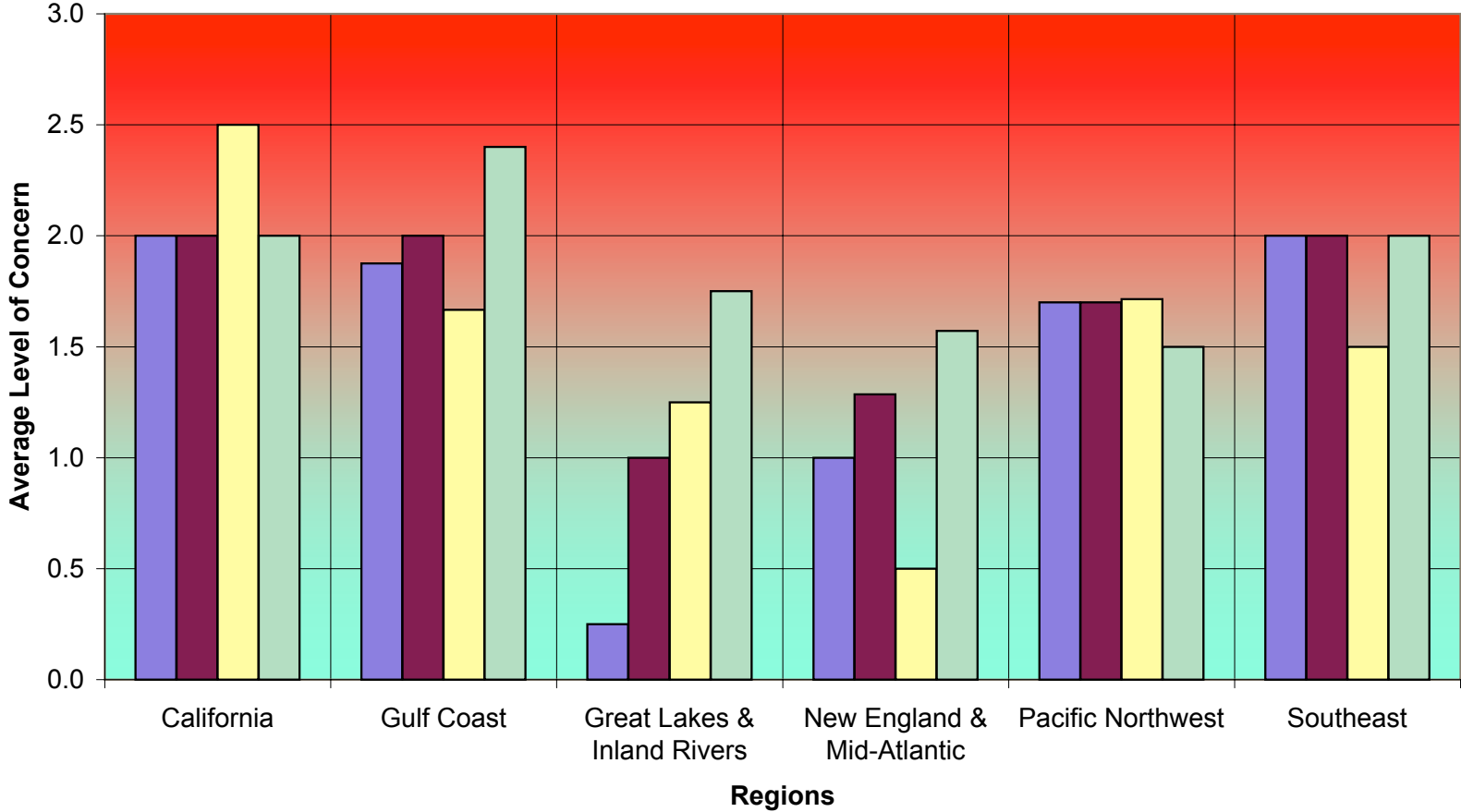


Waste Management



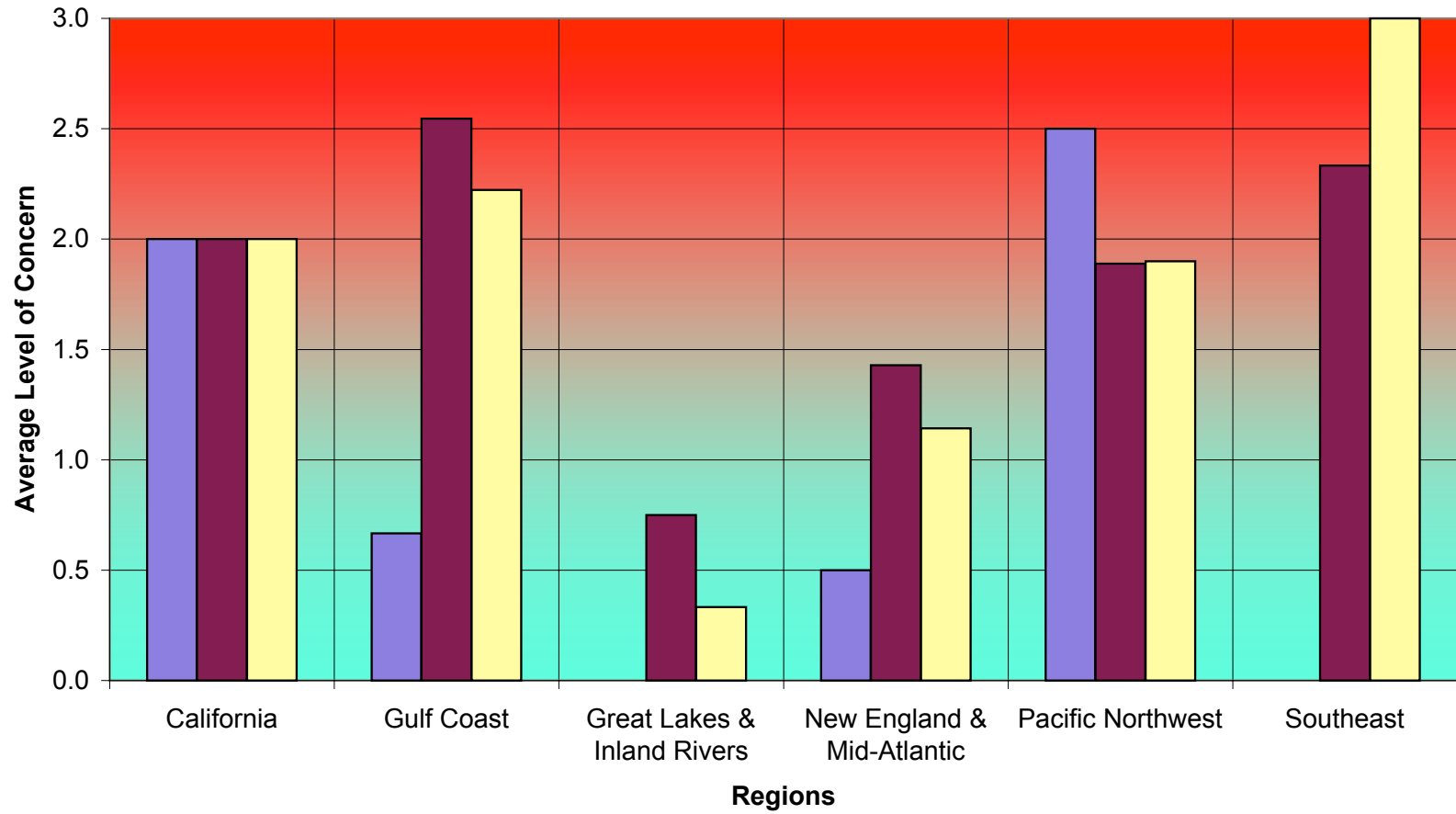
Legend: Solid Waste Management (blue), Hazardous Waste Management (maroon), Special Waste Management (yellow)

Waste Management



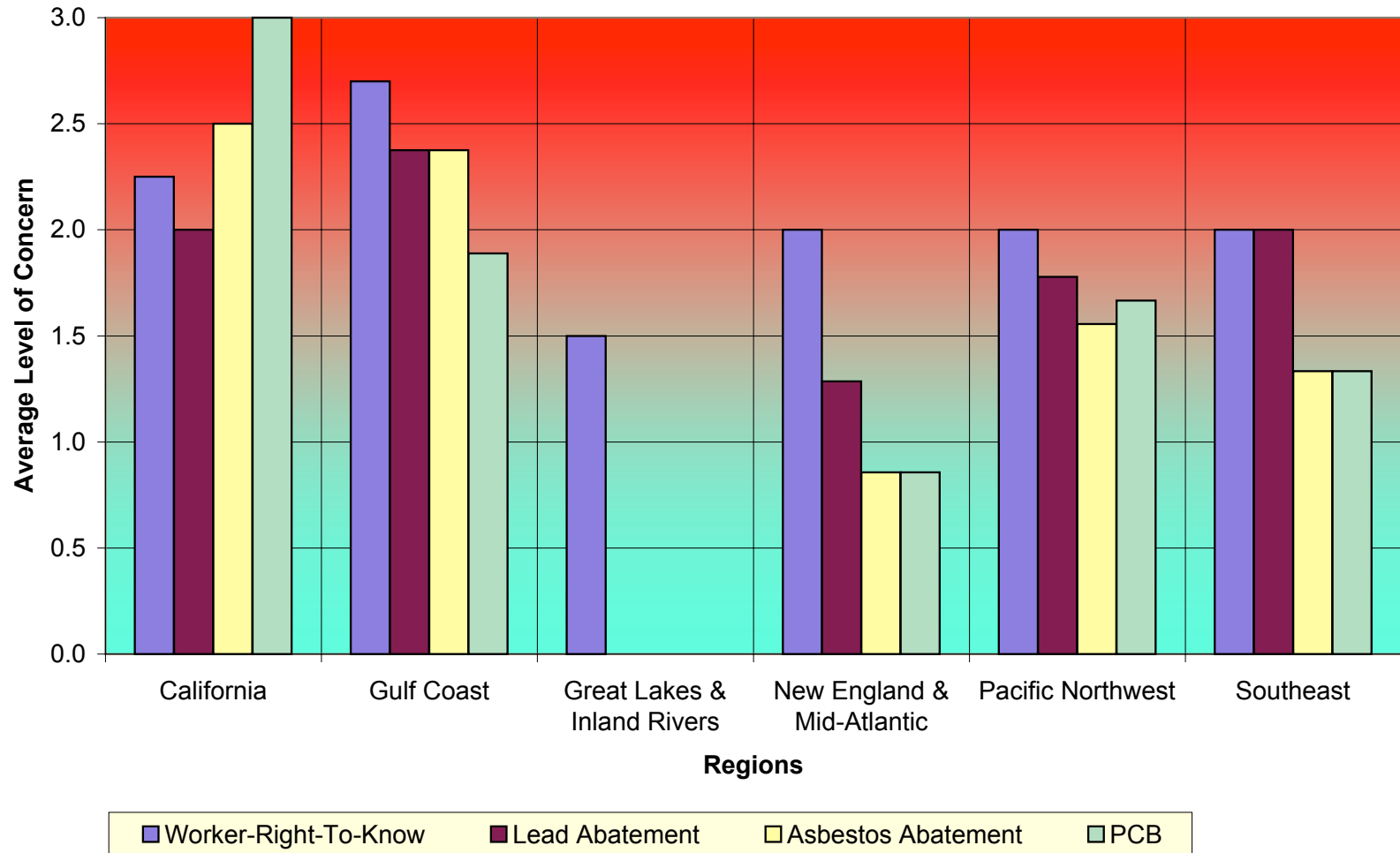
■ On-site Reuse/Recycling ■ Off-Site Reuse/Recycling □ On-Site Waste Treatment □ Used Oil

Hazardous Materials

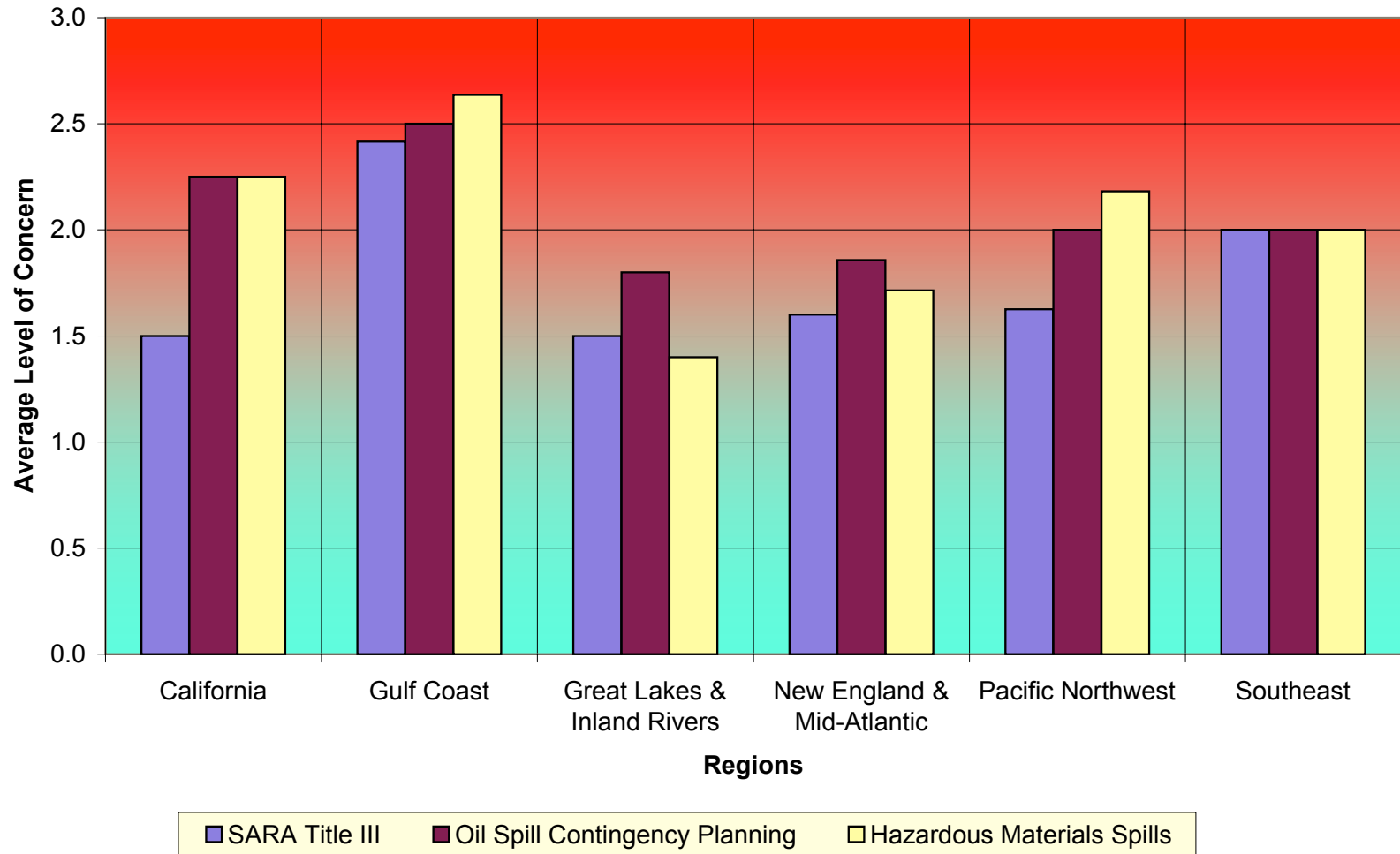


Legend: ■ Underground Storage Tanks ■ Aboveground Storage Tanks ■ Hazardous Materials Transportation

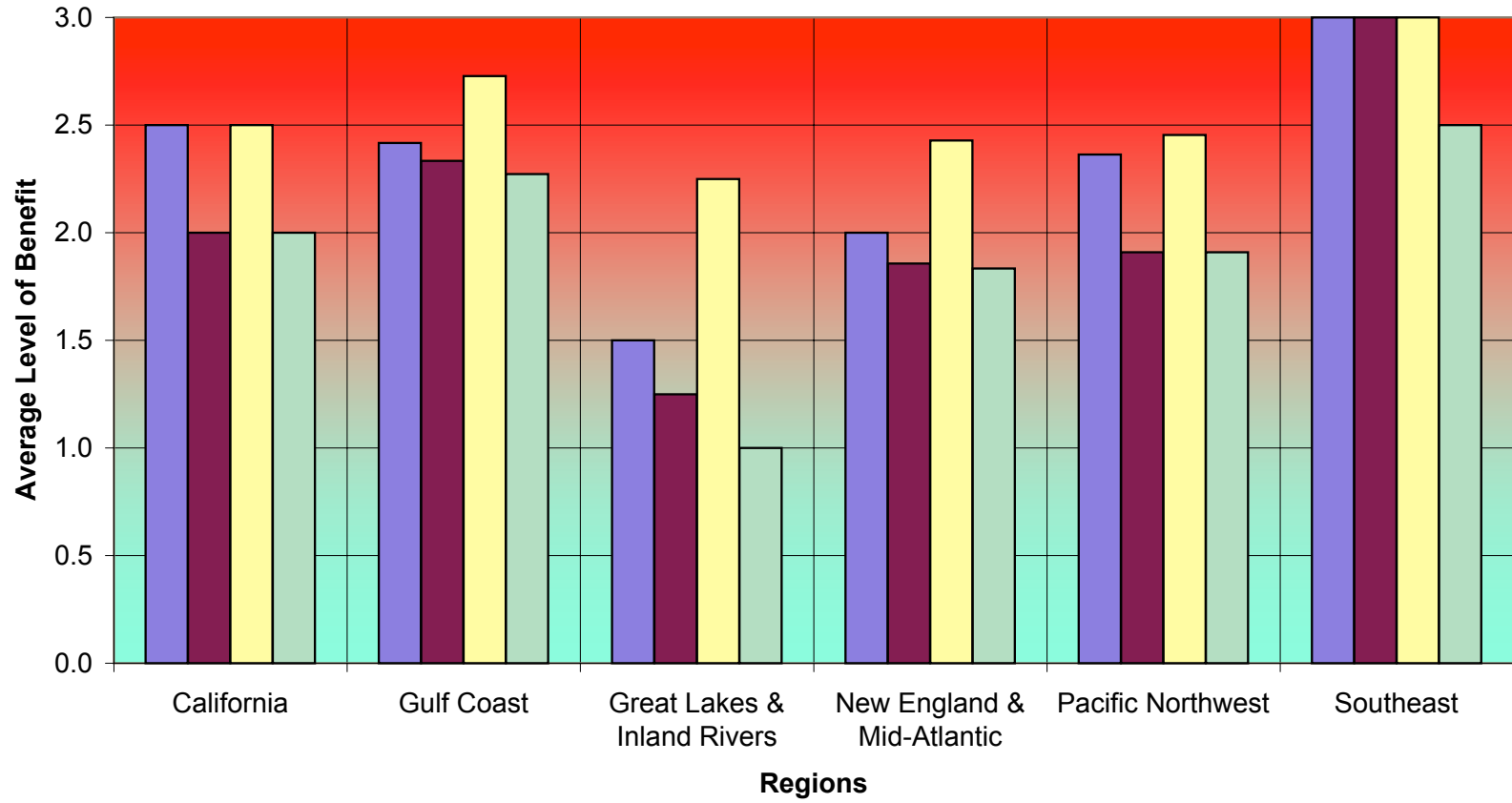
Hazardous Materials



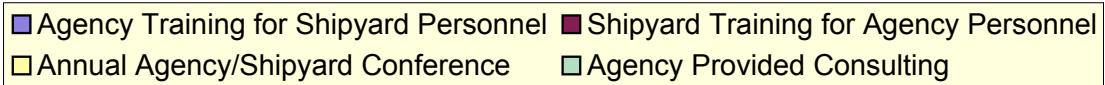
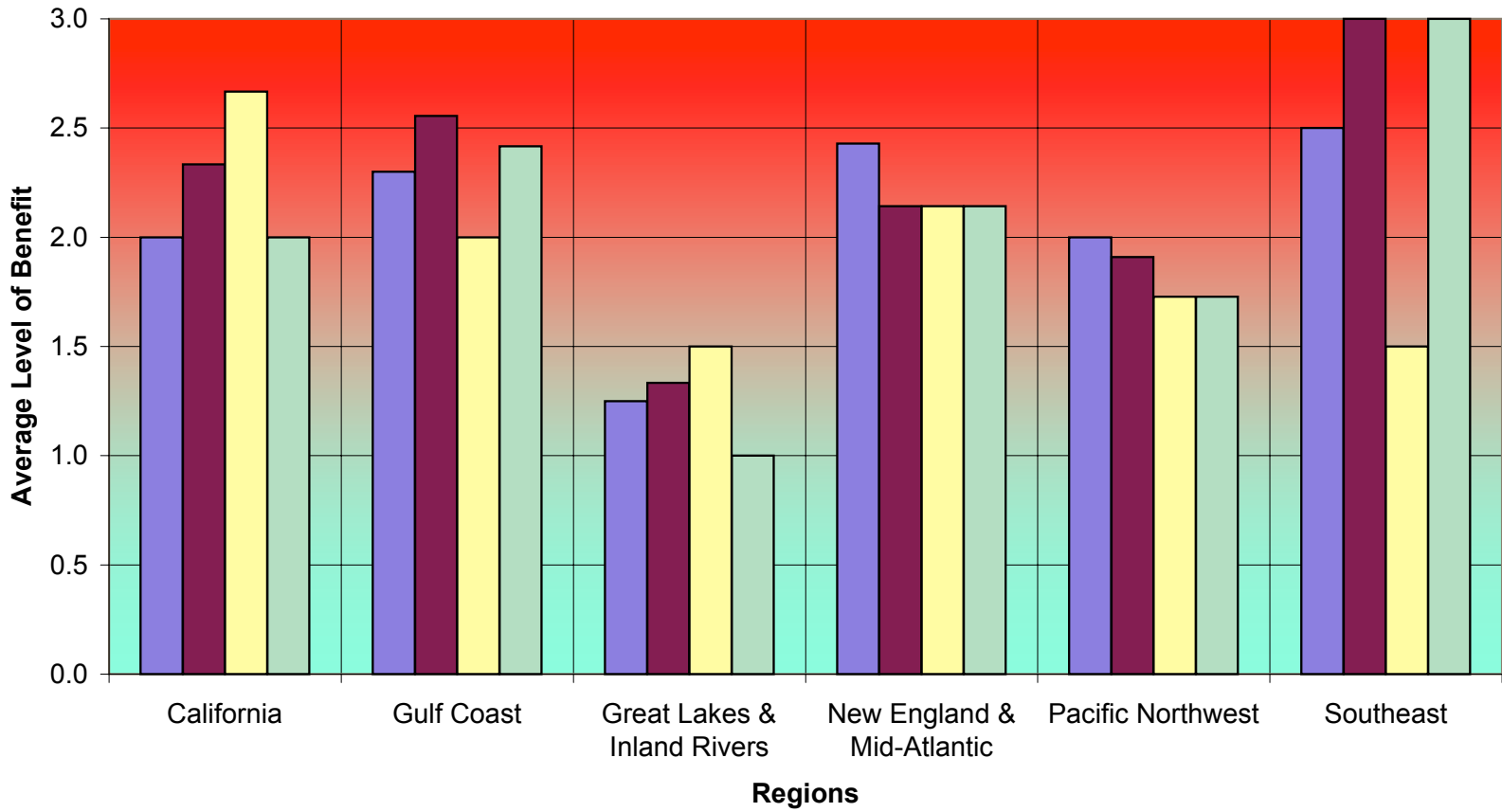
Contingency Planning



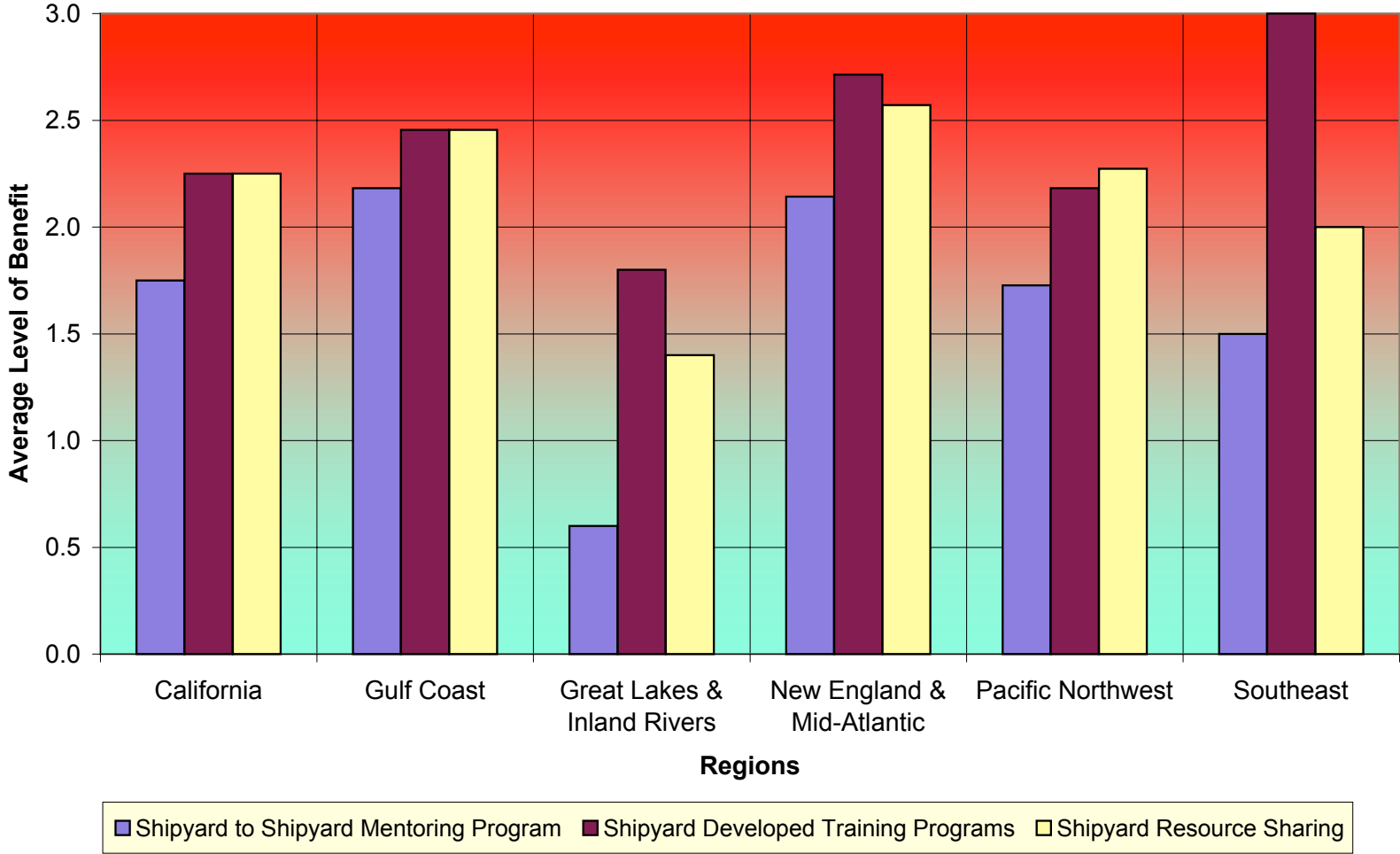
Compliance Assistance - Agency



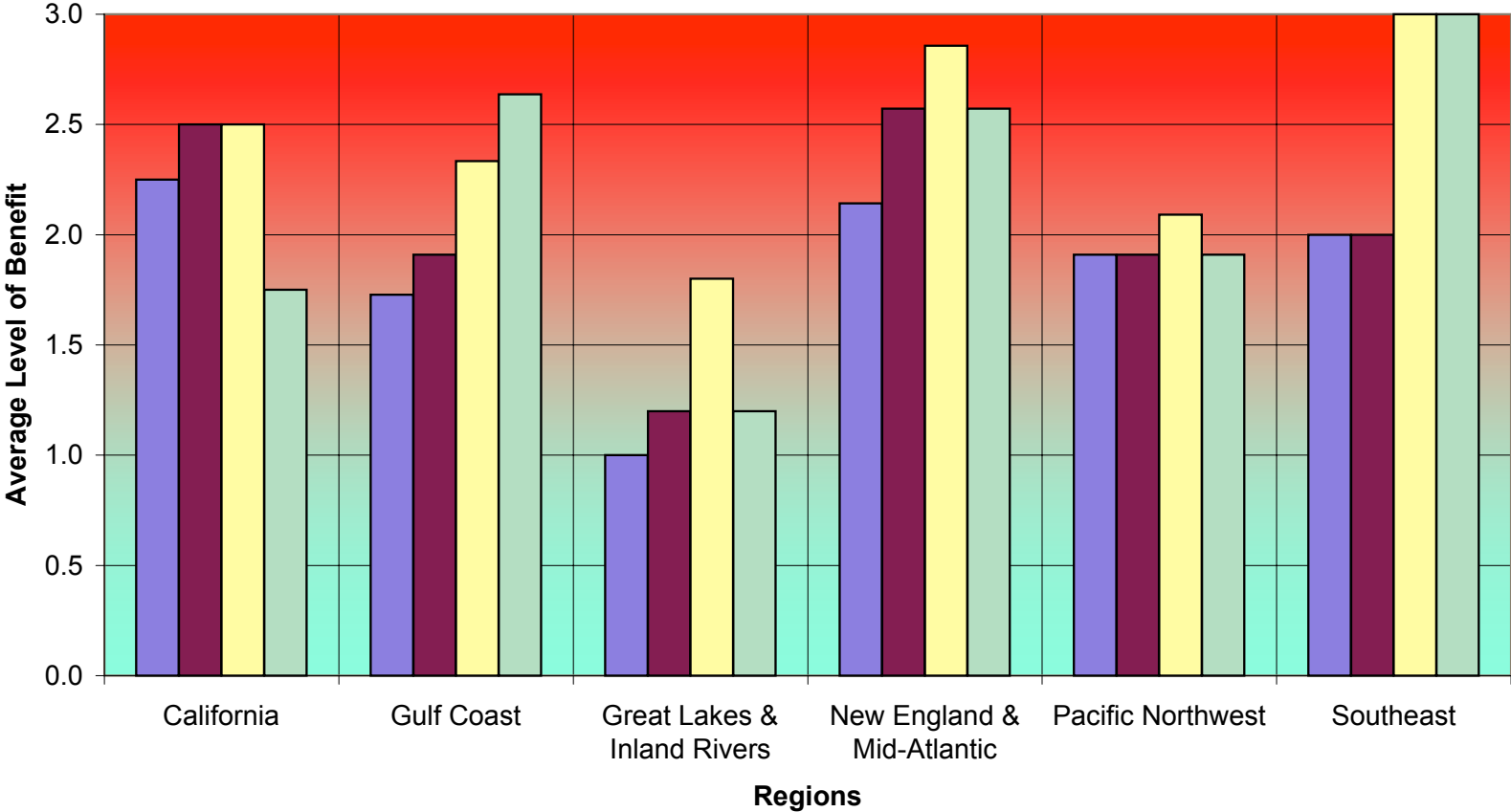
Compliance Assistance - Agency



Compliance Assistance - Industry



Compliance Assistance - Industry



- National Shipyard Environmental Conference
- Regional Shipyard Environmental Conference
- Industry Prepared Guidance Documents
- Industry Point of Contact for Environmental Issues

For more information about the
National Shipbuilding Research Program
please visit:

<http://www.nsrp.org/>

or

<http://www.USAShipbuilding.com/>