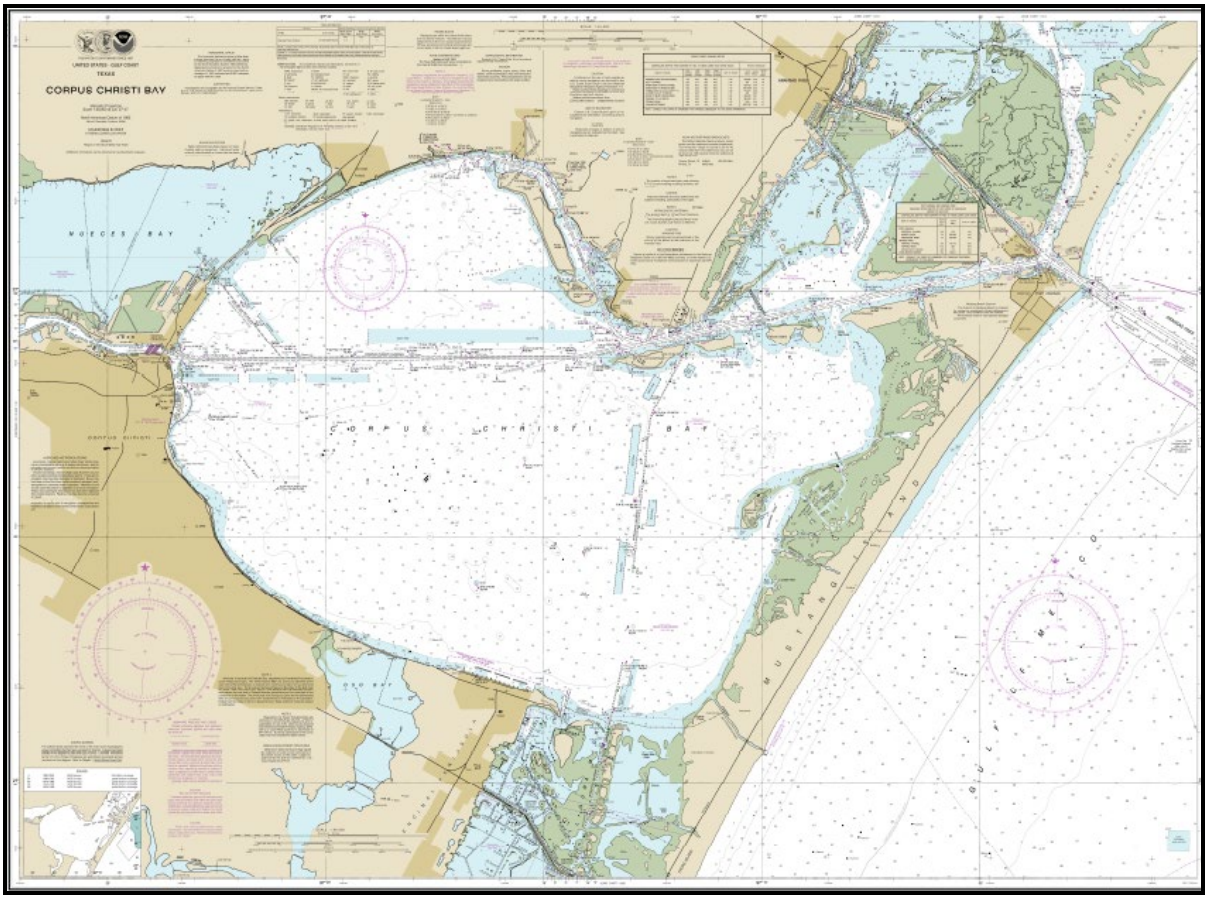
# Ports and Waterways Safety Assessment

# Workshop Report

# Corpus Christi, Texas




**United States Coast Guard**
**Marine Transportation Systems Directorate**

**Providing Navigation Safety Information**
**for America's Waterways Users**

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## Background and Purpose

The United States Coast Guard (USCG), Marine Transportation Systems Directorate, is responsible for developing and implementing policies and procedures that facilitate commerce, improve safety and efficiency, and inspire dialogue with ports and waterway users with the goal of making waterways as safe, efficient, and commercially viable as possible.

Through the 1997 Coast Guard Appropriations Act, the Coast Guard was directed to establish a process to identify minimum user requirements for new Vessel Traffic Service (VTS) systems in consultation with local officials, waterway users and port authorities, and to review private / public partnership opportunities in VTS operations.

The Coast Guard convened a National Dialogue Group (NDG) comprised of maritime and waterway community stakeholders to identify the needs of waterway users with respect to Vessel Traffic Management (VTM) and VTS systems. The NDG was intended to provide the foundation for the development of an approach to VTM that would meet the shared government, industry, and public objectives of ensuring the safety of vessel traffic in U.S. ports and waterways, in a technologically sound and cost effective way.

From the NDG came the development of the ***Ports and Waterways Safety Assessment (PAWSA) Waterway Risk Model,*** and the ***PAWSA workshop process***. PAWSA is a disciplined approach designed to identify major waterway safety hazards, estimate risk levels, evaluate potential mitigation measures, and set the stage for the implementation of selected risk reduction strategies.

The process involves convening a select group of waterway users and stakeholders and facilitating a structured workshop agenda to meet the risk assessment objectives. A successful workshop requires the participation of professional waterway users with local expertise in navigation, waterway conditions, and port safety. In addition, stakeholders are included in the process to ensure that important environmental, public safety, and economic consequences are given appropriate attention as risk interventions are identified and evaluated.

The long-term goals of the PAWSA process are to:

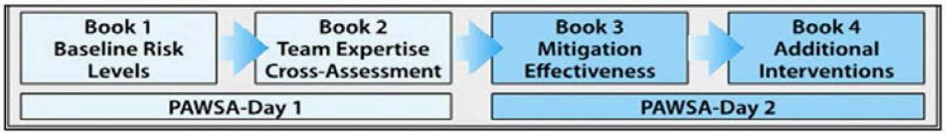
1) Provide input when planning for projects to improve the safety of navigation,
2) Further the Marine Transportation System (MTS) goals of improved coordination and cooperation between government and the private sector, and involving stakeholders in decisions affecting them,
3) Foster development and/or strengthen the roles of Harbor Safety Committees within each port, and
4) Support and reinforce the role of Coast Guard Sector Commanders/Captains of the Port (COTP) in promoting waterway and VTM activities within their geographic areas of responsibility.

62 ports/waterways have been assessed or reassessed using the PAWSA process. The risk assessment process represents a significant part of joint public-private sector planning for mitigating risk in waterways. When applied consistently and uniformly in a number of waterways, the process is expected to provide a basis for making best value decisions for risk mitigation investments, both on the local and national level. The goal is to find solutions that are effective and meet the needs of waterway users and stakeholders.

## PAWSA Waterway Risk Model and Workshop process

The PAWSA Waterway Risk Model includes variables dealing with both the causes of waterway casualties and their consequences. In the Waterway Risk Model, risk is defined as a function of the probability of a casualty and its consequences. The diagram below shows the six general risk categories, and corresponding risk factors, that make up the Waterway Risk Model.

| Waterway Risk Model | | | | | |
|---|---|---|---|---|---|
| **Vessel Conditions** | **Traffic Conditions** | **Navigational Conditions** | **Waterway Conditions** | **Immediate Consequences** | **Subsequent Consequences** |
| Deep Draft Vessel Quality | Volume of Commercial Traffic | Winds | Visibility Impediments | Personnel Injuries | Health and Safety |
| Shallow Draft Vessel Quality | Volume of Small Craft Traffic | Water Movement | Dimensions | Petroleum Discharge | Environmental |
| Commercial Fishing Vessel Quality | Traffic Mix | Visibility Restrictions | Bottom Type | Hazardous Materials Release | Aquatic Resources |
| Small Craft Quality | Congestion | Obstructions | Configuration | Mobility | Economic |




- ***Vessel Conditions*** – The quality of vessels and their crews that operate on a waterway.
- ***Traffic Conditions*** – The number of vessels that use a waterway and how they interact with each other.
- ***Navigational Conditions*** – The environmental conditions that vessels must deal with in a waterway.
- ***Waterway Conditions –*** The physical properties of the waterway that affects vessel maneuverability.
- ***Immediate Consequences*** – The instantaneous impacts to the port as a result of a vessel casualty.
- ***Subsequent Consequences*** – The longer-term impacts felt days, months, and even years afterwards.

Workshop activities include a series of discussions about the port/waterway attributes and the vessels that use the waterway, followed by completion of workbooks to establish baseline risk levels, evaluate the effectiveness of existing risk mitigations, and identify additional risk intervention strategies to further reduce risk in the port / waterway. Workbook 1 is used to numerically evaluate the baseline risk levels using pre-defined qualitative risk descriptions for pre-defined risk factors. Workbook 2 is used to assess the expertise of participants with respect to the risk categories in the model. Those expertise assessments are used to weight inputs obtained during the other steps in the workshop process. Workbook 3 is used to evaluate how effective the existing mitigation strategies are at reducing risks, and to determine if the risks are well balanced or not. For those risk factors where risk is judged to be not well balanced by existing mitigations, participants use workbook 4 to identify additional risk intervention strategies and then evaluate how effective those new strategies could be at reducing risks.

## Corpus Christi PAWSA Workshop

A PAWSA workshop to assess navigation safety within the Corpus Christi Bay was held in Corpus Christi, Texas on 11-12 September, 2019. The workshop was attended by 34 participants representing waterway users, stakeholders, environmental interest groups, and Federal, State and local regulatory authorities. The purpose of the workshop was to bring waterway users, stakeholders and members of the Corpus Christi maritime community together for collaborative discussions. The sponsor of the workshop was Coast Guard Sector Corpus Christi.

Participants discussed the quality of vessels and their crews that operate on the waterway; the volume of commercial, non-commercial and recreational small craft vessel traffic using the waterway, navigational and waterway conditions that mariners encounter when transiting the assessment area, and the potential environmental impacts that could result from a marine casualty or incident on the waterway.

Over the two-day workshop, the participants discussed and then numerically evaluated 24 risk factors in the PAWSA Waterways Risk Model.

Baseline risk levels were first evaluated using pre-defined qualitative risk descriptions for each risk factor. Participants then discussed existing risk mitigation strategies, evaluated how effective those mitigation strategies were at reducing risk, and then determined if the risks were balanced. For those risk factors that were not balanced by existing mitigations, or where there was no consensus that risks were balanced, or not balanced, by existing mitigations, the participants engaged in further discussions and completed workbook 4 to identify additional risk mitigation strategies and evaluated how effective those new strategies could be at reducing risk. The results of the baseline risk level survey, existing risk mitigation strategies, additional risk intervention strategies, and participant comments and observations are outlined in this report.

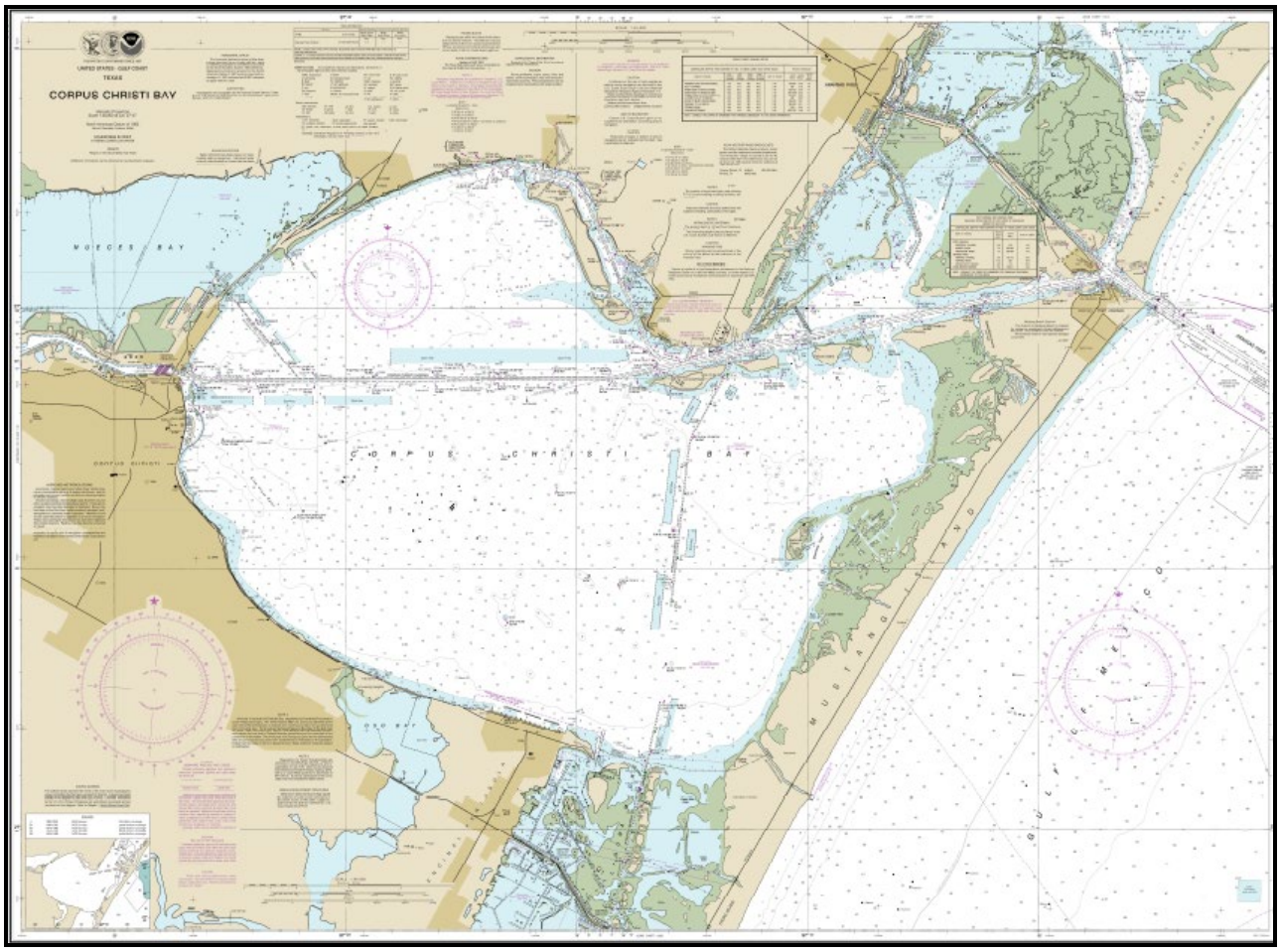
The primary goal of a PAWSA workshop is to improve coordination and cooperation between government agencies and the private sector. A PAWSA workshop is intended to involve stakeholders in decisions affecting them, and provide the Coast Guard and members of the waterway community with an effective tool to evaluate risk and work toward long-term solutions tailored to local circumstances.

In support of these goals, this report should be viewed as a starting point for continued dialogue within the Corpus Christi maritime community. The Coast Guard will use this PAWSA report, together with other information, to determine whether, and to what extent, regulatory or other actions are needed to address navigation safety risk. Any rulemaking efforts will follow Coast Guard public notice and comment rulemaking procedures to allow for public participation in the process.

The United States Coast Guard, Marine Transportation Systems Directorate and Coast Guard Sector Corpus Christi, extend a sincere appreciation to the workshop participants for their contributions to the Corpus Christi PAWSA workshop. Their expertise was critical to the success of the workshop, and their recommendations will greatly assist the Coast Guard as it continues to work with all Corpus Christi stakeholders to further improve safe and efficient navigation within the Port of Corpus Christi.

## Section 1: Corpus Christi PAWSA - Assessment Area

The geographic bounds of the waterway assessment area included the approaches to Corpus Christ (Aransas Pass Channel), and all waters shown on NOAA chart 11309. Nautical chart 11309 was displayed for reference and to annotate geographic locations associated with participant comments and observations; the annotated chart is included as appendix C to this report.



## Section 2: Baseline Risk Levels

The first step in the workshop was the completion of workbook 1 to determine a baseline risk level value for each risk factor in the Waterway Risk Model. To establish the baseline risk levels, participants discussed each of the 24 applicable factors in the Waterway Risk Model and selected a qualitative description for each risk factor that best described the conditions in the assessment area. These qualitative descriptions were converted to discrete values using numerical scales that were developed during earlier PAWSA workshops. What results is the risk level for each risk factor, not taking into account any actions already implemented to reduce risk.

On those scales, 1.0 represents low risk (best case) and 9.0 represents high risk (worst case), with 5.0 being the mid-risk value. Risk values highlighted in red (values at or above 7.7) denote very high baseline risk levels. Risk values highlighted in green (values at or below 2.3) denote very low baseline risk levels.

The table below shows the baseline risk level values for all risk factors evaluated by the workshop participants.

| Baseline Risk Levels | | | | | |
|---|---|---|---|---|---|
| **Vessel Conditions** | **Traffic Conditions** | **Navigational Conditions** | **Waterway Conditions** | **Immediate Consequences** | **Subsequent Consequences** |
| Deep Draft Vessel Quality | Volume of Commercial Traffic | Winds | Visibility Impediments | Personnel Injuries | Health and Safety |
| 3.9 | 7.7 | 4.1 | 7.2 | 3.2 | 8.7 |
| Shallow Draft Vessel Quality | Volume of Small Craft Traffic | Water Movement | Dimensions | Petroleum Discharge | Environmental |
| 4.4 | 4.2 | 3.2 | 8.0 | 9.0 | 6.8 |
| Commercial Fishing Vessel Quality | Traffic Mix | Visibility Restrictions | Bottom Type | Hazardous Materials Release | Aquatic Resources |
| 8.3 | 5.7 | 1.8 | 4.3 | 9.0 | 6.5 |
| Small Craft Quality | Congestion | Obstructions | Configuration | Mobility | Economic |
| 6.7 | 5.7 | 3.0 | 8.6 | 9.0 | 8.6 |

## Section 3: Team Expertise Cross-assessment

The second step in the workshop was the completion of a team expertise cross-assessment (workbook 2). The team expertise cross-assessment was conducted early in the workshop process and was used to weigh the relative strengths of each team with respect to the six risk categories. The results of the team expertise cross-assessment was used to weight the inputs that each team provided in the other workbooks completed during the workshop.

After being presented with the concepts underlying the model, each participant team was asked to discuss (among themselves) how their background and experience aligns with the model. They then verbally presented their self-assessment to the other teams. These presentations gave all teams a sense of where everyone thought they were strong – or perhaps not so strong. After all teams had spoken, each team then evaluated whether they were in the top, middle, or lower third of all teams present with respect to knowledge and expertise in the six risk category areas. The participants assessed their own and all the other participant teams' level of expertise for each of the six risk categories in the Waterway Risk Model.

The table below breaks down the participants' expertise for each risk category.

**Team Expertise -- Distribution**

| Risk Category | Top 1/3 | Mid 1/3 | Lower 1/3 |
|---|---|---|---|
| Vessel Conditions | 40% | 32% | 27% |
| Traffic Conditions | 40% | 36% | 24% |
| Navigational Conditions | 43% | 36% | 21% |
| Waterway Conditions | 43% | 38% | 19% |
| Immediate Consequences | 37% | 39% | 24% |
| Subsequent Consequences | 32% | 37% | 31% |

| All Categories Average | 39% | 37% | 24% |
|---|---|---|---|

## Section 4: Existing Risk Mitigations

The third step in the workshop was for participants to evaluate the effectiveness of existing mitigation strategies in reducing the risk level for each risk factor. Workbook 3 is used for two purposes. First, after the participants describe the risk mitigation strategies that already exist to help reduce the risk level for their waterway, workbook 3 is used to evaluate the effectiveness of those strategies in reducing the risk level for each factor in the model. What results from that evaluation is the present risk level, taking into account those existing mitigations. Second, the participants decide whether the risk mitigation strategies already in place adequately balance the resulting risk level. If, for any given risk factor, there is consensus (defined as 2/3 of the workshop participant teams in agreement**)** that existing mitigations do adequately deal with those risks, then that risk factor is dropped from further discussion.

For risk factors show in green (Balanced) there was consensus that risks were balanced by existing mitigations.

For risk factors shown in yellow (Maybe) there was no consensus that risks were balanced by existing mitigations.

For risk factors shown in red (Rising) there was no consensus that risks were balanced by existing mitigations , and the book 3 mitigated risk level was higher than the book 1 baseline risk level.

For risk factors shown in red (NO) there was consensus that risks were not balanced by existing mitigations.

| Mitigation Effectiveness | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Vessel Conditions | | Traffic Conditions | | Navigational Conditions | | Waterway Conditions | | Immediate Consequences | | Subsequent Consequences | |
| Deep Draft Vessel Quality | | Volume of Commercial Traffic | | Winds | | Visibility Impediments | | Personnel Injuries | | Health and Safety | |
| 3.85 | 3.95 | 7.7 | 7.2 | 4.1 | 4.3 | 7.2 | 6.4 | 3.2 | 3.1 | 8.7 | 7.6 |
| Rising | | Maybe | | Balanced | | Balanced | | Balanced | | Balanced | |
| Shallow Draft Vessel Quality | | Volume of Small Craft Traffic | | Water Movement | | Dimensions | | Petroleum Discharge | | Environmental | |
| 4.4 | 4.2 | 4.2 | 4.2 | 3.2 | 3.0 | 8.0 | 8.2 | 9.0 | 7.8 | 6.8 | 6.7 |
| Balanced | | Balanced | | Balanced | | NO | | Balanced | | Balanced | |
| Commercial Fishing Vessel Quality | | Traffic Mix | | Visibility Restrictions | | Bottom Type | | Hazardous Materials Release | | Aquatic Resources | |
| 8.3 | 8.5 | 5.7 | 5.4 | 1.8 | 2.1 | 4.3 | 4.3 | 9.0 | 7.8 | 6.5 | 6.4 |
| NO | | Balanced | | Balanced | | Balanced | | Balanced | | Balanced | |
| Small Craft Quality | | Congestion | | Obstructions | | Configuration | | Mobility | | Economic | |
| 6.7 | 6.3 | 5.7 | 5.5 | 3.0 | 2.7 | 8.6 | 8.4 | 9.0 | 8.2 | 8.6 | 7.8 |
| Balanced | | Balanced | | Balanced | | Maybe | | Balanced | | Balanced | |

| Risk Factor | |
|---|---|
| Book 1 Score | Book 3 Score |
| Consensus Reached? | |

| EXPLANATION | |
|---|---|
| Book 1 Score | Level of risk - not taking into account existing mitigations |
| Book 3 Score | Level of risk - taking into account existing mitigations |
| Balanced | Consensus that risks are well balanced by existing mitigations |
| Maybe | No consensus that risks are well balanced by existing mitigations |
| Rising | No consensus, and the Book 3 score is higher than the Book 1 score |
| NO | Consensus that existing mitigations DO NOT adequately balance risks |

Following the workshop, errors discovered in the PAWSA Decision Support Tool (MS excel file) resulted in decimal point changes to the reported results. The numbers shown in parentheses are the incorrect risk levels that were reported at the workshop.

For the following 19 risk factors, there ***was consensus that risks were balanced*** by existing mitigations:

| Risk Factor | Base Line Risk Level | Risk Level with Existing Mitigations |
|---|---|---|
| Petroleum Discharge | 9.0 | 7.8 (7.6) |
| Hazardous Materials Release | 9.0 | 7.8 (7.7) |
| Mobility | 9.0 | 8.2 (8.1) |
| Health and Safety | 8.7 | 7.6 |
| Economic | 8.6 | 7.8 (7.7) |
| Visibility Impediments | 7.2 | 6.4 (6.2) |
| Environmental | 6.8 | 6.7 (6.6) |
| Small Craft Quality | 6.7 | 6.3 |
| Aquatic Resources | 6.5 | 6.4 (6.2) |
| Traffic Mix | 5.7 | 5.4 |
| Congestion | 5.7 | 5.5 |
| Shallow Draft Vessel Quality | 4.4 | 4.2 |
| Bottom Type | 4.3 | 4.3 (4.2) |
| Volume of Small Craft Traffic | 4.2 | 4.2 (4.3) |
| Winds | 4.1 | 4.3 (4.1) |
| Water Movement | 3.2 | |
| 3.0 (2.9) | | |
| Personnel Injuries | 3.2 | 3.1 |
| Obstructions | 3.0 | 2.7 |
| Visibility Restrictions | 1.8 | 2.1 |

For the following two risk factors, there ***was no consensus*** that risks were balanced, or not balanced, by existing mitigations.

| | | |
|---|---|---|
| Volume of Commercial Traffic | 7.7 | 7.2 |
| Configuration | 8.6 | 8.4 |

For one risk factor, there ***was no consensus*** that risks were adequately balanced by existing mitigations and the book 3 mitigated risk level was higher than the book 1 baseline risk level:

| Risk Factor | Base Line Risk Level | Risk Level with Existing Mitigations |
|---|---|---|
| Deep Draft Vessel Quality | 3.85 | 3.95 |

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For the remaining two risk factors, there ***was consensus that risks were NOT balanced*** by existing mitigations.

| Risk Factor | Base Line Risk Level | Risk Level with Existing Mitigations |
|---|---|---|
| Commercial Fishing Vessel Quality | 8.3 | 8.5 |
| Dimensions | 8.0 | 8.2 |

## Section 5: Additional Risk Intervention Strategies

The last step in the workshop process was to complete workbook 4, wherein workshop participants propose additional risk interventions. Due to workshop time constraints, the workshop participants elected to complete workbook 4 for the Deep Draft Vessel Quality, Volume of Commercial Traffic and Dimensions risk factors. The table below shows each proposed mitigation strategy and the predicted risk level that could be obtained if the proposed strategy was implemented.

| Risk Factor | Mitigation Strategy | Risk Level (w/existing mitigations) | Risk Level (w/new strategy) |
|---|---|---|---|
| **Deep Draft Vessel Quality** | Mitigation Strategy 1 - Reduce impacts from loss of propulsion casualties by establishing escort zones for deep draft vessels at Harbor Island and Ingleside. | 3.9 | **2.1** |
| | Mitigation Strategy 2 - To improve vessel maneuverability, establish minimum vessel trim requirements for transiting the area. | 3.9 | 2.8 |
| | Mitigation Strategy 3 - Use "big data "and preferred vessels lists to prioritize inspections/survey/vetting for vessels. | 3.9 | 3.3 |
| **Volume of Commercial Traffic** | Mitigation Strategy 1 - Widen the channel in the Port Ingleside area sufficient for vessels with beam restrictions to meet. | 7.2 | **3.9** |
| | Mitigation Strategy 2 - By the of CY 2020, initiate a feasibility study on future channel improvement projects. | 7.2 | 5.5 |
| | Mitigation Strategy 3 - Research alternatives to existing/current range systems, such as "passing ranges" and "sailing arrangements". | 7.2 | 5.2 |
| | Mitigation Strategy 4 - Reduce the probability of vessel allisions and collisions by having the Harbor Safety Committee develop vessel transit reference/guidance for commercial users, that includes areas requiring special attention. | 7.2 | 5.7 |
| | Mitigation Strategy 5 - To reduce the probability of vessel collisions, allisions and groundings, add another factor to the vessel meeting and movement Harbor Safety Committee guidelines. | 7.2 | 5.5 |
| | Mitigation Strategy 6 - To promote a common operating picture, establish a universal dispatch system. | 7.2 | 5.2 (5.3) |
| | Mitigation Strategy 7 - By 2021, enhance the ability to safely manage vessel movements by establishing a Cooperative Vessel Traffic Service. | 7.2 | 4.3 |
| | Mitigation Strategy 8 - To enhance the ability of the waterway to safely manage traffic, establish one way traffic windows throughout the entirety of the commercial channel. | 7.2 | 5.0 |
| | Mitigation Strategy 9 - By the end of 2020, conduct a vessel traffic study to forecast future trends of commercial traffic throughout the Port of Corpus Christi. | 7.2 | 6.3 |

| | | | |
|---|---|---|---|
| **Dimensions** | Mitigation Strategy 1 - By CY 2021, fully fund the authorized the 54 foot deepening/widening project. Inner harbor not to be widening. | 8.2 | 5.3 |
| | Mitigation Strategy 2 - Widen the channel in the Port Ingleside area sufficient for vessels with beam restrictions to meet. | 8.2 | **3.9** |
| | Mitigation Strategy 3 - Research alternatives to existing/current range system, such as "passing ranges" and "sailing arrangements". | 8.2 | 5.5 |
| | Mitigation Strategy 4 - Support public/private partnerships to fund and expedite dredge projects, outside Federally funded appropriations. | 8.2 | 6.0 |
| | Mitigation Strategy 5 - Expedite the dredging process and save funding by enacting a Jones Act exemption for dredging companies. | 8.2 | 7.2 |
| | Mitigation Strategy 6 - By the of CY 2020, start the feasibility study on the next channel improvement projects. | 8.2 | 6.2 |
| | Mitigation Strategy 7 - Reduce the probability of allisions and collisions by having the South Texas Harbor Safety Committee develop references for commercial users, to include areas requiring special attention. | 8.2 | 6.0 |
| | Mitigation Strategy 8 - Add another factor to the vessel and movement guidelines to reduce the probability of vessel collisions, allisions and groundings. | 8.2 | 6.3 |

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**Appendix A**

## Workshop Participants

| Participant | Organization |
|---|---|
| Joelle Francois | AECOM |
| Adam Sisson | AECOM |
| Eric Crabtree | Ardent- Salvage and Marine Firefighting |
| Mike Kershaw | Aransas-Corpus Christi Pilots |
| Kevin Monaco | Aransas-Corpus Christi Pilots |
| Jack Carroll | BP Shipping |
| Gina Sanchez | Corpus Christi Municipal Marina |
| Mike Winans | Cheniere Energy |
| Kevin Miller | Citgo Petroleum Corporation |
| Sharon Lewis | City of Corpus Christi |
| Arvinderjit Keith | Eaglestar Ship Management |
| John Perez | Flint Hills Resources, LLC |
| Xavier Valverde | G&H Towing Company |
| Mike Warner | Genesis Marine |
| Kris Lamb | Kirby Corporation |
| Matthew Peterson | Moran Shipping Agencies |
| John Metz | National Oceanic and Atmospheric Administration |
| Dave Edgecomb | Pin Oak Terminals |
| Russell Pickering | Port of Corpus Christi Authority |
| Russell Cordo | Port of Corpus Christi Authority |
| Tom Mylett | Port of Corpus Christi Authority |
| Danielle Hale | Port of Corpus Christi Authority |
| Jay Rivera | Riben Marine, Inc. |
| Tom Rodino | Rodino, Inc. |
| Kevin Gibson | Signet Maritime Corporation |
| Felix Trevino | Texas Department of Transportation |
| James Harris | Texas Department of Transportation |
| Brent Howard | U.S. Army Corps of Engineers |
| Lee Otten | U.S. Cybersecurity & Infrastructure Security Agency – Region VI - Texas |
| Jerry Butwid | U.S. Coast Guard Sector Corpus Christi |
| David Browne | U.S. Coast Guard Sector Corpus Christi |

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|---|---|
| Edward Iversen | U.S. Coast Guard Sector Corpus Christi |
| Geoffrey Souris | U.S. Coast Guard Auxiliary |
| Joe Harrington | Valero Energy |

**Appendix B**

## Participant Observations- Trends in the Port and Existing Risk Mitigations

The workshop participants are local subject matter experts and these comments capture their opinions and analysis, providing a general sense of the ideas discussed during the workshop. These comments provide various perspectives representing widely different interests and should not be construed to represent the views of or statements by the United States Coast Guard.

### Deep Draft Vessel Quality

**(Vessels 1600 Gross Tons and higher engaged in commercial trade)**

**Trends/Observations:**

- Vessels evaluated under this category included Tank Vessels, Chemical Ships, Bulk Cargo Carriers, Roll On/Roll Off Vessels, Liquefied Natural Gas (LNG) Carriers, Car Carriers, and Container Ships.
- Freight vessels tend to be the older vessels typically due to limited investment into maintenance.
- USCG marine inspectors typically find a lot of issues on the older freight ships.
- The requirements of having lower sulfur emission has been linked to some casualties within the port. The vessels lose propulsion which can cause the vessel to lose its maneuverability qualities within the port. This is due to the nature of having to switch over to the lower sulfur fuel, when doing so the machinery might experience complications.
- Regarding multiple crew nationalities on foreign flagged vessels, communication can be challenging in conducting important drills due to language barriers.
- Due to numerous audits, as well as crews being under pressure from their companies and regulatory bodies to ensure they comply with the paperwork aspect of the audit process, they sometimes lose focus of the bigger picture when it comes to vessel proficiency.
- Being a 24-hour port, there are big risks with the amount of time some crews are working with little sleep.
- U.S. flagged deep draft commercial vessels are subject to USCG and Flag State Administration inspection and certification requirements. The vessels must also meet applicable classification society requirements[1].
- Foreign flagged vessels are subject to the International Convention for the Safety of Life at Sea (SOLAS)[2] and International Convention for the Prevention of Pollution from Ships (MARPOL)[3] requirements.
- Foreign flagged vessels are subject to the USCG 96-hour Notice of Arrival and Departure (NOAD)[4] reporting regulations that identify and prioritize foreign flagged commercial vessels for USCG Port State Control (PSC)[5] vessel inspections.

[1] Vessel Classification Societies: http://maritime-connector.com/wiki/classification-society/
[2] SOLAS Convention: http://www.imo.org/en/About/Conventions/ListOfConventions/Pages/International-Convention-for-the-Safety-of-Life-at-Sea-(SOLAS),-1974.aspx
[3] MARPOL Convention: http://www.imo.org/en/About/Conventions/ListOfConventions/Pages/International-Convention-for-the-Prevention-of-Pollution-from-Ships-(MARPOL).aspx

**Existing Mitigations:**

- USCG Vessel Inspection regulations
- USCG Port State Control regulations
- USCG Notice of Arrival and Departure reporting regulations
- SOLAS and MARPOL Convention requirements
- Industry internal vetting programs and vessel assurance programs for liquefied natural gas carriers (LNGs)
- Tug Escorts for VLCCs and LNGs when approaching jetties
- Pilot Rules of Navigation

## Shallow Draft Vessel Quality

**(Vessels less than 1600 Gross Tons engaged in commercial trade)**

**Trends/Observations:**

- Deep draft vessels are referred to as the "Blue Water Fleet" while shallow draft vessels are the "Groundwater Fleet." The inner coastal waterway, the Brown Water Fleet, are the inland push boats and the inland barges. The Blue Water Fleet are the ships that travel outside the jetties.
- The Brown Water Fleet is very well maintained. Some of the companies have large fleets and have departments that keep their equipment maintained.
- Many of the larger companies are very good about staying ahead of maintenance issues and complying with safety laws. Smaller companies whose vessels tend to be more subpar than some of the larger corporations. Most of the maintenance problems are associated with the Brown Water Fleet.
- Issues with language barrier are common when it comes to naming conventions. For example, some of the docks and landmarks within the area are called by different names. Because there are so many new facilities in the Port of Corpus Christi, the National Oceanographic and Atmospheric Administration (NOAA) is unable to update all coast pilots and charts. This is a result of new docks being built and dock name changes. NOAA's process to update these items is a very lengthy process which is a result of them collaborating with the Port of Corpus Christi Authority (POCCA), however, no one from the POCCA has yet reached out to NOAA on these issues.
- There are concerns of too much chatter on Channel 12, the main navigational communication channel in the port. The port took a course of action, to have mariners use Channel 9 for conversations that are lengthy or not related to navigation.

[4] USCG NOAD regulations: https://www.govinfo.gov/content/pkg/FR-2015-01-30/pdf/2015-01331.pdf
[5] USCG PSC regulations: https://www.dco.uscg.mil/Our-Organization/Assistant-Commandant-for-Prevention-Policy-CG-5P/Inspections-Compliance-CG-5PC-/Commercial-Vessel-Compliance/Foreign-Offshore-Compliance-Division

**Existing Mitigations:**

- USCG Subchapter M – Towing Vessel Inspection Regulations[6]
- USCG Subchapter T - Passenger Vessel Inspection Regulations[7]
- USCG Subchapter K - Passenger Vessel Inspection Regulations[8]

## Commercial Fishing Vessel Quality

**Trends/Observations:**

- The USCG does not issue certificates of inspection for these vessels. However, there is a program in place in which a marine inspector connects with the fishing community.
- Commercial Fishing vessels that operate beyond three nautical miles are required to be inspected by the USCG.[9] Upon passing these inspections, commercial fishing vessels receive decals instead of certificates of inspection. Decals are typically good for five years.
- There is a low percentage of commercial fishing vessels passing inspections. Of the 500 Commercial Fishing vessels in the Corpus Christi area, there are only 54 vessels that receive inspection decals per year.
- There are also voluntary dockside exams[10] in which staff board vessels and walk the docks. The purpose is to develop relationships with commercial fishermen and to conduct exams in order to avoid issues offshore.
- In general, the material condition of these vessels are not great.
- The operators of these vessels are not required to be licensed by the USCG or required to be enrolled in a drug or alcohol random testing program. This presents a huge risk since every licensed mariner is required to be enrolled in drug or alcohol random testing program.
- Communication is always a problem due to language barriers and operators not complying with communication protocols, such as not using the radio. It is common that many of these vessels have crews who speaks little or no English. Because of the lack of communication, most interactions with Commercial Fishing Vessels are described as being based on assumptions of what the vessel intends to do.
- Regarding vessel operations knowledge, there is a limited understanding of how to operate the vessel in terms of compliance or adhering to navigation standards, navigation rules, and basic general rules of the road.

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[6] USCG Subchapter M: https://www.govinfo.gov/content/pkg/CFR-2016-title46-vol5/pdf/CFR-2016-title46-vol5-chapI-subchapM.pdf

[7] USCG Subchapter T: https://www.govinfo.gov/content/pkg/CFR-2012-title46-vol7/pdf/CFR-2012-title46-vol7-chapI-subchapT.pdf

[8] USCG Subchapter K: https://www.govinfo.gov/content/pkg/CFR-2012-title46-vol4/pdf/CFR-2012-title46-vol4-chapI-subchapK.pdf

[9] Mandatory Safety Exams for Commercial Fishing Vessels: https://www.dco.uscg.mil/Portals/9/DCO%20Documents/5p/MSIB/2015/012_15_10-20-2015.pdf

[10] Voluntary Dockside Exams: https://www.dco.uscg.mil/Portals/9/DCO%20Documents/5p/CG-5PC/CG-CVC/CVC3/policy/COMDINST_16711_14.pdf

- It is crucial to educate the commercial fisherman, especially the shrimpers that the tug, barges and larger vessels in the blue water fleet are not able to go around them. When they see these ships approaching, it is critical to get out of the channel and let them pass.

**Existing Mitigations:**

- USCG Subchapter M – Towing Vessel Inspection Regulations
- USCG Subchapter T and K - Passenger Vessel Inspection Regulations
- Voluntary Dockside exams

## Small Craft Vessel Quality

**Trends/Observations:**

- Issues with inebriation are very common.
- The marina is starting up a partnership with the USCG Auxiliary to conduct additional training for recreational boaters.
- A large quarter of recreational vessels are sailboats.
- There are also a large number of yachts. The yachts are of various sizes ranging anywhere between 20 to 175 feet.
- A majority of the small craft utilized emergency towing services and have good communication abilities when they do break down.
- The USCG program, American Waterways Watch[11], is an application available to mariners to report suspicious activity in the maritime community, "see something, say something."
- The State of Texas just enacted the Kill Switch Law[12] which states that vessels under 27 feet must have a kill switch.

**Existing Mitigations:**

- USCG Auxiliary Vessel Safety Checks[13]
- Tow boats
- American Waterways watch
- Kill Switch Law

## Volume of Commercial Traffic

**Trends/Observations:**

- With the port averaging about 11 vessel movements a day, that comes out to just under 4,000 vessel movements annually. This does not include the LNG vessel arrivals.

[11] American Waterways Watch: https://www.dco.uscg.mil/Our-Organization/Assistant-Commandant-for-Prevention-Policy-CG-5P/Inspections-Compliance-CG-5PC-/Port-and-Facility-Compliance-CG-FAC/Americas-Waterway-Watch/
[12] Safety Requirements for Vessels: https://tpwd.texas.gov/fishboat/boat/safety/vessel_requirements/index.phtml
[13] USCG Auxiliary Vessel Safety Checks: http://cgaux.org/vsc/

- There are 4,700 arrivals for brown water vessels.[14] There are 850 inner harbor ship movements per month for brown water vessels.
- Regarding waterway suitability assessments, the private companies and all of the private docks are surveyed independently.
- The South Texas Waterways Advisory Committee[15] meets quarterly to discuss various issues that arise in the port.

**Existing Mitigations:**

- South Texas Waterways Advisory Committee
- Waterway Suitability Assessments and more frequent analysis of the waterways

## Volume of Small Craft Traffic

**Trends/Observations:**

- The USCG evaluates and determines if additional safety measures are needed for certain events. The largest events are typically during the 4th of July for fireworks displays and also Christmas boat parades. Event locations range anywhere from being in Corpus Christi to regions further south, typically around the marinas where people live on the water. Some waterfront homeowners have boat slips and work with their homeowners associations to conduct Christmas boat parades, which increases the volume of small craft traffic on the water.
- There have been incidences in which unexpected weather occurs.
- During New Year's Eve, there are fire events that come up.
- There are usually sailboat races that occur in Corpus Christi Bay which sometimes takes place across the ship channel and Inter-coastal Waterway.
- Seasonal small craft traffic volumes increased during the hunting and fishing season which is from November to January
- Events such as spring break bring larger numbers of small craft operators to the area, the summer season contributes to traffic mixing and congestion.

**Existing Mitigations:**

- USCG Broadcast Notice to Mariners
- USCG Local Notice to Marines
- Inner harbor restrictions for small craft traffic

[14] Appendix F: Corpus Christi PAWSA - Vessel Transit Statistics
[15] South Texas Waterways Advisory Committee: https://www.stwac.org/

## Traffic Mix

**Trends/Observations:**

- For the Corpus Christi marina, the peak time are the months from May to September.
- Areas that experience a heavy mix of different vessels types is the Port Aransas area, the main shipping channel, Ingleside and the area just outside the entrance to the inner harbor cannel.

**Existing Mitigations:**

- USCG Broadcast Notice to Mariners
- USCG Local Notice to Marines

## Congestion

**Trends/Observations:**

- With the large amount of crude oil being transported through the Port of Corpus Christi, there is a potential huge increase of vessel traffic. LNG pilots have received their second simulator training session, so the number of LNG ship arrivals has doubled. The number of LNGs could potentially increase to roughly 400 LNG ship arrivals each year.

**Existing Mitigations:**

- USCG Broadcast Notice to Mariners
- USCG Local Notice to Marines

## Winds

**Trends/Observations:**

- There is a total of 5,600 hours of weather-related closures in the port within the past 10 years. That relates to 600 hours per year or 25 full days per year for weather related closures. Three of those days were due to the wind; 20 of those days were due to visibility restrictions.
- The port currently has a NOAA Physical Oceanographic Real-Time System (PORTS)[16] in place that only consists of three stations at this time.
- The Port of Corpus Christi Harbor Master sends out broadcast emails for weather events on high winds notifying users of channel closures.

**Existing Mitigations:**

- NOAA PORTS system
- Harbor Master Broadcast Emails

[16] PORTS: https://tidesandcurrents.noaa.gov/ports.html

## Water Movement

**Trends/Observations:**

- There are cross currents across the jetties and around Harbor Island. The majority of the currents are found near Ingleside which impacts vessels trying to maneuver in and out of the La Quinta Channel and the lower basin.
- Currents average approximately 2 knots, but can increase in velocity when heavy rainfall impacts the area.

**Existing Mitigations:**

- NOAA PORTS system
- Harbor Master Broadcast Emails

## Visibility Restrictions

**Trends/Observations:**

- Typical fog season has a big impact on the refineries. The harbor master and sometimes the USCG sets up a ship movement priority list.
- Fog that results in a port closure is experienced approximately 20 days each year, the primary time period when this occurs is from September through April.

**Existing Mitigations:**

- NOAA PORTS
- The National Weather Service is working closely with the POCCA Harbor Safety Office, to help with fog forecasting and improving the models to better forecast fog.

## Obstructions

**Trends/Observations:**

- Either during post-storm situations or when the USACE has no access to a particular area for an extended period of time, the currents accumulate sand within that area.
- The USACE surveys the entire channel at least twice a year and surveys known hot spots even more frequently.
- USCG Marine Safety Information Bulletins[17] alert mariners of hazards to navigation (obstructions) and is able to conduct a modified port coordination team call depending on the severity of the obstruction.

**Existing Mitigations:**

- Marine Safety Information Bulletins
- Modified port coordination team call
- USACE dredging and bottom surveys
- Marine contractors to remove obstructions

[17] USCG MSIB: https://www.dco.uscg.mil/Featured-Content/Mariners/Marine-Safety-Information-Bulletins-MSIB/

## Visibility Impediments

**Trends/Observations:**

- There is a green bright light at the pier just inbound of the pilot station in the ship channel. The general concern is that this light is too bright and is a visibility impediment.
- There are two blind spots; Rockport cut and Lydia Ann.
- The ranges are difficult to see in the La Quinta Channel B cut.

**Existing Mitigations:**

- Facilities are taking it upon themselves to improve visibility of aids to navigation

## Dimensions

**Trends/Observations:**

- The current guidelines under which the Port of Corpus Christi operates were established in 2012.
- The port is over capacity and the channel dimensions pose transit restriction in some areas.

**Existing Mitigations:**

- Current projects underway to dredge the main shipping channel to a depth of 54 feet
- USACE dredging and bottom surveys

## Bottom Type

**Trends/Observations:**

- This waterway has a hard bottom type.
- The dredge channel is a slope channel with a composition of mud and flake. The inner harbor has the same bottom type.

**Existing Mitigations:**

- Current projects underway to dredge the main shipping channel to a depth of 54 feet
- USACE dredging and bottom surveys

## Configuration

**Trends/Observations:**

- There are turns greater than 45 degrees near the following: Harbor Island, the intersection of the main ship channel and the Intercostal Waterway, as well as both the south end and the north end of La Quinta Channel.
- There are no barge shelfs along the main shipping channel.

**Existing Mitigations:**

- Current projects underway to dredge the main shipping channel to a depth of 54 feet
- USACE dredging and bottom surveys

## Personnel Injuries

**Trends/Observations:**

- There is a huge number of ferry transits in a course of one year, carrying from 3.1 to 6.3 million passengers annually.
- Ferries exceed no more than 150 passengers per trip.
- In areas where there are cruise ships, there is a greater level of risk.
- Trends in a particular marine casualty are documented, then letters are sent to companies identifying specific trends of potential casualties that could lead to potential injuries or major marine casualties. The captain of the board goes out to those companies with recommended mitigations for that risk area.
- The Texas General Land Office, Community Development and Revitalization Program,[18] has mass rescue plans and regional mass casualty plans. This is a regionally collaborative effort between the USCG and the various members. Representatives from the USCG are included in regional drills, as well as planning issues.

**Existing Mitigations:**

- USCG responds to all reported marine casualties
- Documentation and trend analysis of Marine Casualties
- Hazardous areas on vessels are painted yellow to notify crew members and passengers
- Community Development and Revitalization Program mass rescue plans and regional mass casualty plans

## Petroleum Discharge

**Trends/Observations:**

- The port often has vessels with greater than 10,000 deadweight tonnage that carry petroleum products.
- There are several contingency plans that outline spill response efforts in the event of a petroleum discharge. These include the USCG Area Contingency Plan for the South Texas Coastal Zone[19] and the USCG Maritime Transportation System Recovery Plan[20].
- The USCG has established Marine Transportation System Recovery Units (MTSU) [21] and plans to assist in restoring port functions and resuming commercial activity as quickly as possible following a significant port disruption.
- Oil Spill Response and Removal Organizations have pollution response resources to immediately respond to a pollution incident.

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[18] Texas Community Development and Revitalization Program: https://recovery.texas.gov/preparedness/index.html
[19] Area Contingency Plan for the South Texas Coastal Zone: https://homeport.uscg.mil/my-homeport/contingency-plans/area-contingency-plan?cotpid=22
[20] USCG MTSRP: https://homeport.uscg.mil/Lists/Content/Attachments/58837/Marine%20Transportation%20System%20Recovery%20Plan%20REV2.pdf
[21] USCG MTSRU: https://homeport.uscg.mil/Lists/Content/Attachments/1626/MTSRU%20Information%20Sheet%20v4%200.pdf

- Environmentally Sensitive Index (ESI)[22] maps show areas that are designated as environmentally sensitive and have environmental restrictions in place to protect marine species and endangered aquatic resources.
-

**Existing Mitigations:**

- Terminals are placing oil containment boom around vessels that are moored at the facilities
- USCG Marine Transportation System Recovery Plan
- USCG Marine Transportation System Recovery Units
- Oil Spill Response and Removal Organizations
- South Texas Area Contingency Plan
- Geographic Response Plans
- Environmentally Sensitive Index maps
- Annual pollution response exercises

## Hazardous Materials Release:

**Trends/Observations:**

- The port often has vessels with greater than 10,000 deadweight tonnage that carry hazardous material.

**Existing Mitigations:**

- Terminals are placing oil containment boom around vessels that are moored at the facilities
- USCG Marine Transportation System Recovery Plan
- USCG Marine Transportation System Recovery Units
- Oil Spill Response and Removal Organizations
- South Texas Area Contingency Plan
- Geographic Response Plans
- Environmental Sensitivity Index maps
- Annual pollution response exercises

[22] Environmental Sensitivity Index (ESI) maps provide a concise summary of coastal resources that are at risk if an oil spill occurs nearby. Examples of at-risk resources include biological resources (such as birds and shellfish beds), sensitive shorelines (such as marshes and tidal flats), and human-use resources (such as public beaches and parks). https://response.restoration.noaa.gov/resources/environmental-sensitivity-index-esi-maps

## Mobility:

**Trends/Observations:**

- A major marine casualty, depending on which kind it is and where it happens, could cause significant disruption to the infrastructure.
- Any disruption of the marine waterway is going to cost significant disruption on the backside. This is due to a significant amount of cargo that is based on timely deliveries.
- If the port were to shut down, its impact to the overall transportation system could potentially cost $100 million a day.

**Existing Mitigations:**

- Port Coordination Team Calls to facilitate rapid re-opening
- USCG Marine Transportation System Recovery Plan
- USCG Marine Transportation System Recovery Units
- South Texas Area Contingency Plan

## Health and Safety:

**Trends/Observations:**

- The local population surges by 100,000 during the spring break time frame.
- Aransas County's population doubles in the wintertime from 30,000 to 60,000.
- Ingleside's population is typically 910,000.
- Portland's population is typically 20,000.

**Existing Mitigations:**

- Scalable evacuation plan currently in place
- Roadways are designed to offer large population evacuation routes
- Registry programs containing behavioral analysis tools (identifies personnel most likely to evacuate, as well as most vulnerable)
- Industries warning systems having "Neighbor Lists" built into notification systems
- USCG Marine Transportation System Recovery Plan
- USCG Marine Transportation System Recovery Units
- South Texas Area Contingency Plan

## Environmental:

**Trends/Observations:**

- The South Texas Coastal Zone Area Contingency plan[23] defines environmentally-sensitive areas. It also list the geographic response plans associated with those areas. This information could be utilized in rapidly identifying these locations in the wake of a spill.
- Noted that there is a national wildlife refuge in Redfish Bay for protected sea grass and sea turtles.
- Water fowl habitats exists all along the bay.
- Noted that there is a water treatment plant dumping into Oso Bay.

**Existing Mitigations:**

- USCG Marine Transportation System Recovery Plan
- USCG Marine Transportation System Recovery Units
- Oil Spill Response and Removal Organizations
- South Texas Area Contingency Plan
- Geographic Response Plans
- Environmentally Sensitive Index maps
- Response training to minimize spill impact

## Aquatic Resources:

**Trends/Observations:**

- In the potential case of a major marine casualty involving the discharge and release of a hazardous chemicals or oil substance, it could impact the oyster beds.
- There are approximately 500 commercial fishing vessels in the Corpus Christi area, many of which are oyster boats.
- Depending on the type of discharge, it could impact the sea grass beds which harvest the shrimp.

**Existing Mitigations:**

- Oil Spill Response and Removal Organizations
- South Texas Area Contingency Plan
- Geographic Response Plans
- Environmentally Sensitive Index maps

[23] South Texas Coastal Zone Area Contingency plan https://www.glo.texas.gov/ost/acp/corpus/sectorcorpuschristiacp2019.pdf

## Economic:

**Trends/Observations:**

- The long-term economic impact from an extended port closure would be oil prices rising possibly leading to fuel shortages.
- An economic impact study was conducted for the Port of Corpus Christi in 2015.[24]
- Corpus Christi is the fourth largest port in the country. It is the number one exporter of crude oil in the country.[25]

**Existing Mitigations:**

- USCG Marine Transportation System Recovery Plan
- USCG Marine Transportation System Recovery Units
- Oil Spill Response and Removal Organizations
- South Texas Area Contingency Plan

[24] Economic Impact Study: https://portofcc.com/wp-content/uploads/CorpusChristi2016_FINAL-1.pdf
[25] Appendix G: Waterway Profile Information

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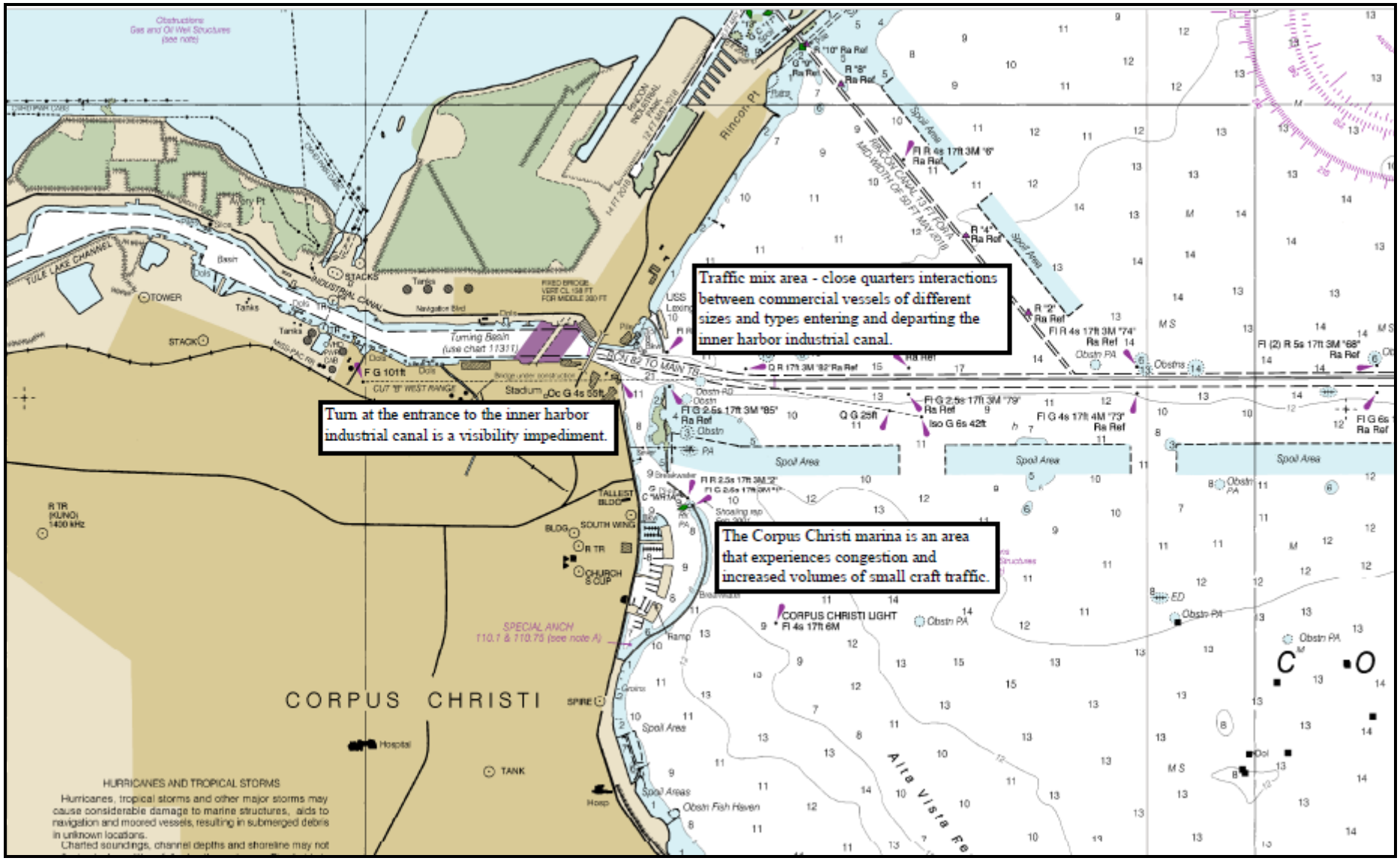
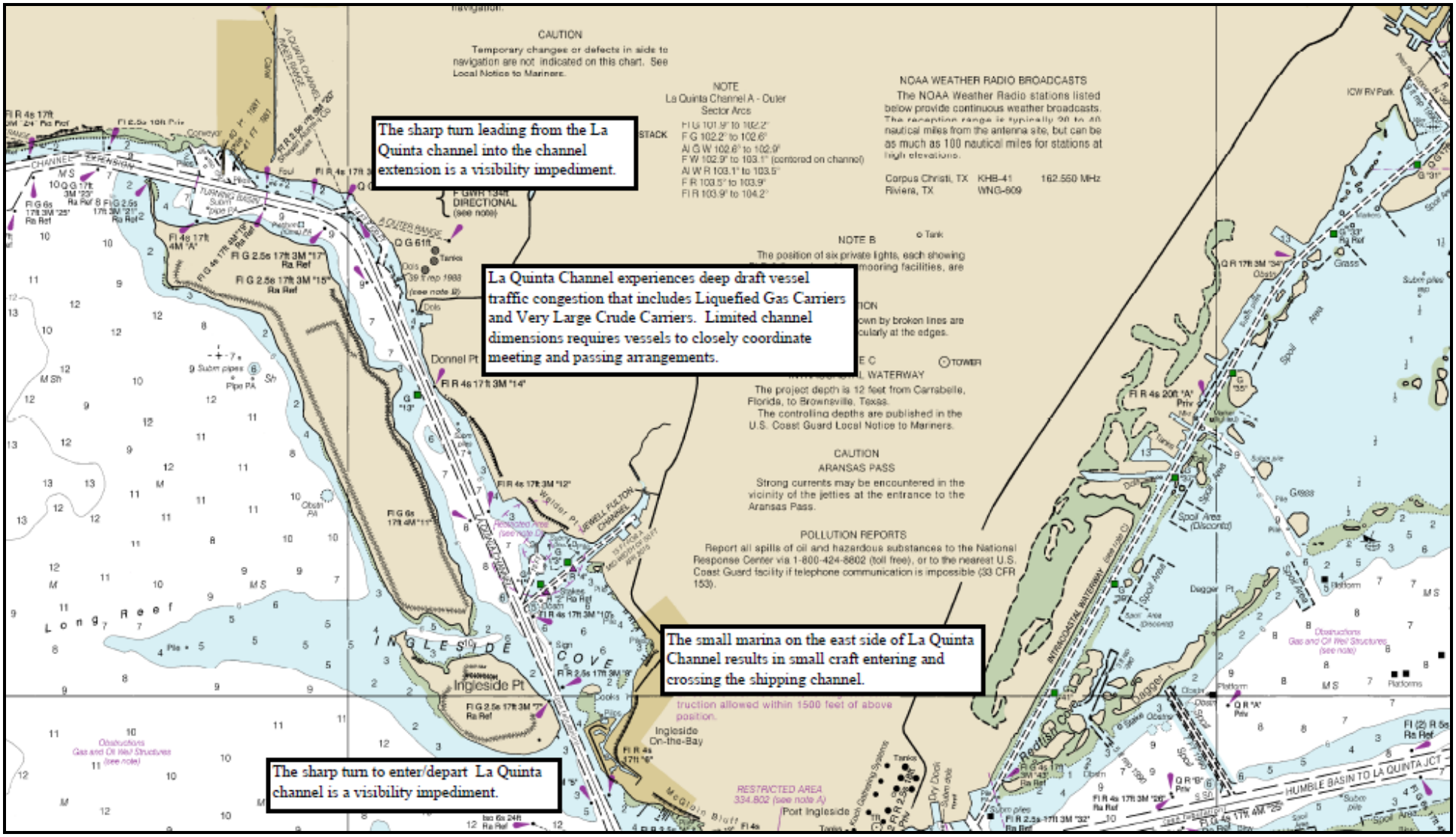
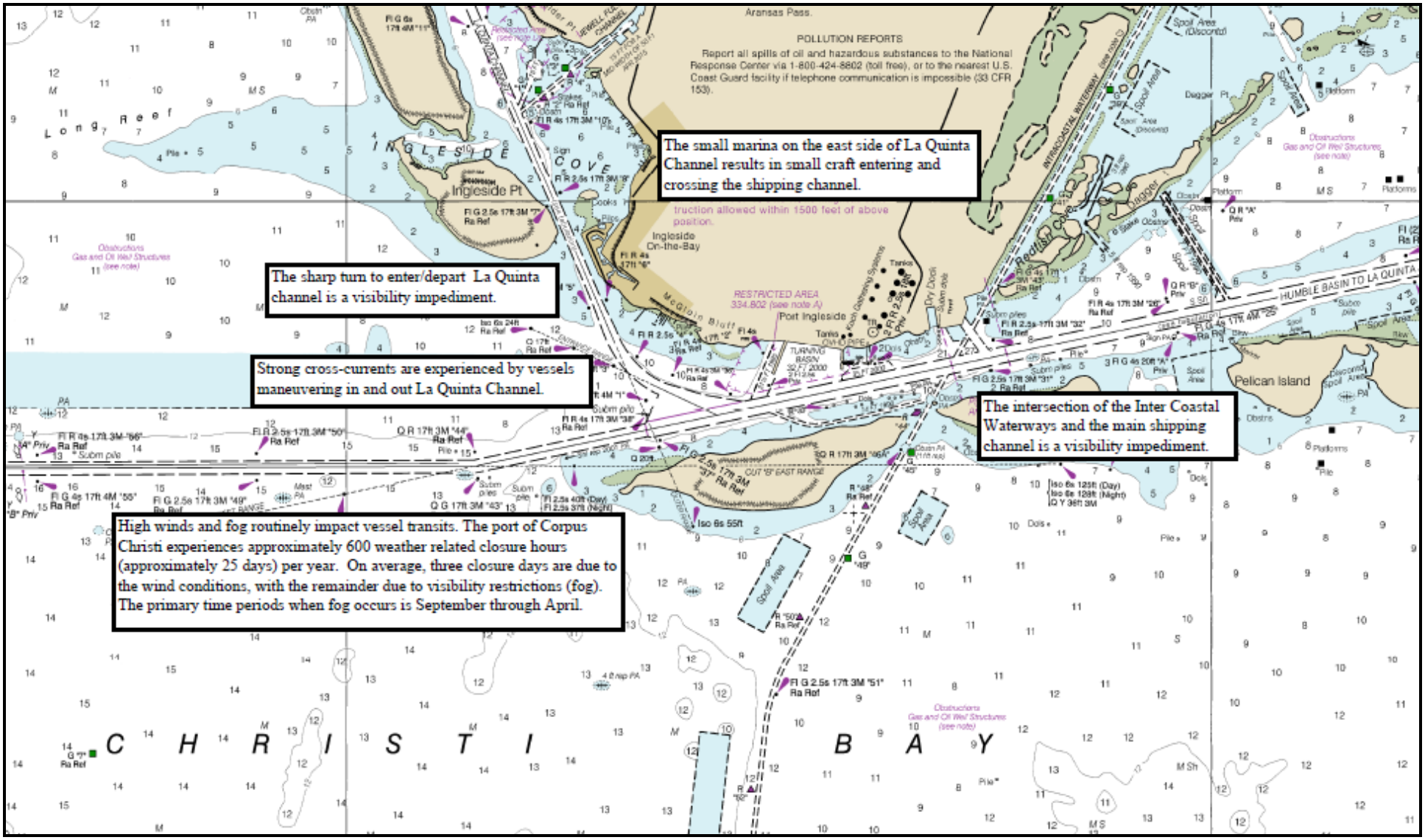
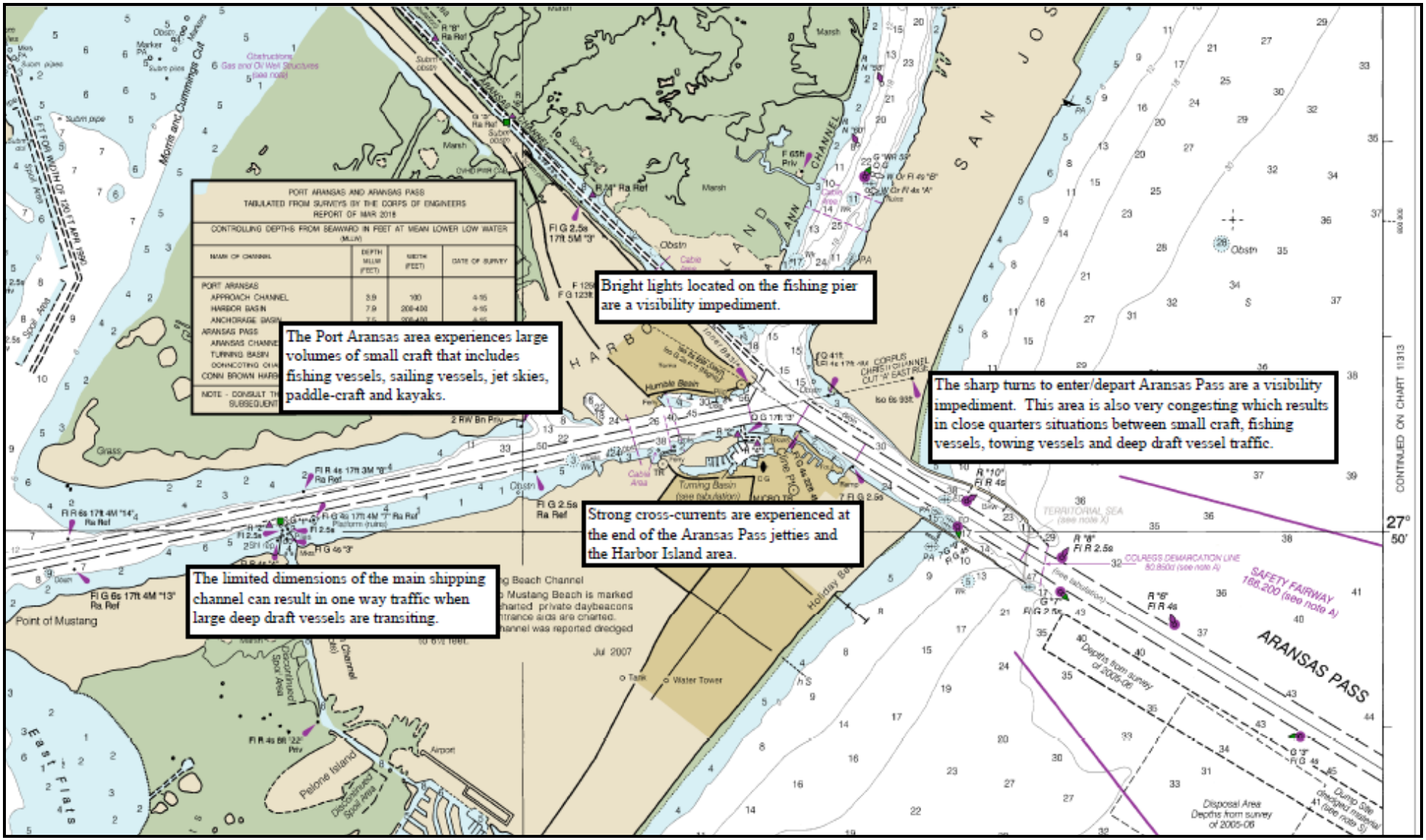
Appendix C


Traffic mix area - close quarters interactions between commercial vessels of different sizes and types entering and departing the inner harbor industrial canal.
Turn at the entrance to the inner harbor industrial canal is a visibility impediment.
The Corpus Christi marina is an area that experiences congestion and increased volumes of small craft traffic.
CORPUS CHRISTI
HURRICANES AND TROPICAL STORMS
Hurricanes, tropical storms and other major storms may cause considerable damage to marine structures, aids to navigation and moored vessels, resulting in submerged debris in unknown locations.
Charted soundings, channel depths and shoreline may not


The sharp turn leading from the La Quinta channel into the channel extension is a visibility impediment.
La Quinta Channel experiences deep draft vessel traffic congestion that includes Liquefied Gas Carriers and Very Large Crude Carriers. Limited channel dimensions requires vessels to closely coordinate meeting and passing arrangements.
The small marina on the east side of La Quinta Channel results in small craft entering and crossing the shipping channel.
The sharp turn to enter/depart La Quinta channel is a visibility impediment.
CAUTION
Temporary changes or defects in aids to navigation are not indicated on this chart. See Local Notice to Mariners.
NOAA WEATHER RADIO BROADCASTS
The NOAA Weather Radio stations listed below provide continuous weather broadcasts.
Corpus Christi, TX KHB-41 162.550 MHz
Riviera, TX WNG-609
CAUTION
ARANSAS PASS
Strong currents may be encountered in the vicinity of the jetties at the entrance to the Aransas Pass.
POLLUTION REPORTS
Report all spills of oil and hazardous substances to the National Response Center via 1-800-424-8802 (toll free), or to the nearest U.S. Coast Guard facility if telephone communication is impossible (33 CFR 153).
Donnel Pt
Ingleside Pt
INGLESIDE COVE
Ingleside On-the-Bay
Long Reef
Redfish Cove
Spoil Area
Grass
HUMBLE BASIN TO LA QUINTA JCT


The small marina on the east side of La Quinta Channel results in small craft entering and crossing the shipping channel.
The sharp turn to enter/depart La Quinta channel is a visibility impediment.
Strong cross-currents are experienced by vessels maneuvering in and out La Quinta Channel.
The intersection of the Inter Coastal Waterways and the main shipping channel is a visibility impediment.
High winds and fog routinely impact vessel transits. The port of Corpus Christi experiences approximately 600 weather related closure hours (approximately 25 days) per year. On average, three closure days are due to the wind conditions, with the remainder due to visibility restrictions (fog). The primary time periods when fog occurs is September through April.
Aransas Pass.
POLLUTION REPORTS
Report all spills of oil and hazardous substances to the National Response Center via 1-800-424-8802 (toll free), or to the nearest U.S. Coast Guard facility if telephone communication is impossible (33 CFR 153).
Long Reef
INGLESIDE COVE
Ingleside Pt
Ingleside On-the-Bay
Port Ingleside
Pelican Island
HUMBLE BASIN TO LA QUINTA
CHRISTI BAY


The Port Aransas area experiences large volumes of small craft that includes fishing vessels, sailing vessels, jet skies, paddle-craft and kayaks.
Bright lights located on the fishing pier are a visibility impediment.
The sharp turns to enter/depart Aransas Pass are a visibility impediment. This area is also very congesting which results in close quarters situations between small craft, fishing vessels, towing vessels and deep draft vessel traffic.
Strong cross-currents are experienced at the end of the Aransas Pass jetties and the Harbor Island area.
The limited dimensions of the main shipping channel can result in one way traffic when large deep draft vessels are transiting.
PORT ARANSAS AND ARANSAS PASS
TABULATED FROM SURVEYS BY THE CORPS OF ENGINEERS
REPORT OF MAR 2018
CONTROLLING DEPTHS FROM SEAWARD IN FEET AT MEAN LOWER LOW WATER
PORT ARANSAS
APPROACH CHANNEL
HARBOR BASIN
ANCHORAGE BASIN
ARANSAS PASS
ARANSAS CHANNEL
TURNING BASIN
CONNECTING CHA
CONN BROWN HARB
ARANSAS PASS
Point of Mustang
Port Aransas
Harbor Island
Humble Basin
Turning Basin
Mustang Beach Channel
Jul 2007
Tank
Water Tower
Airport
Palone Island
East Flats
Grass
Marsh
Obstn
Obstructions
Gas and Oil Well Structures
Subm pipe
Subm obstn
Spoil Area
Discontinued Spoil Area
Morris and Cummings Cut
5 FT FOR WIDTH OF 125 FT APR 1990
HARBOR ISLAND CHANNEL
CORPUS CHRISTI CHANNEL CUT "A" EAST RGE
COLREGS DEMARCATION LINE
SAFETY FAIRWAY
168.200 (see note A)
TERRITORIAL SEA
ARANSAS PASS
Depths from survey of 2005-06
Disposal Area
Depths from survey of 2005-06
Dump Site designated material
CONTINUED ON CHART 11313
27° 50'

**Appendix D**

## References


Texas Parks & Wildlife Department
https://tpwd.texas.gov/

Texas Commission on Environmental Quality
https://www.tceq.texas.gov/

Texas Boater Education Courses
https://tpwd.texas.gov/education/boater-education

Port of Corpus Christi Authority:
https://portofcc.com/

U.S. Coast Guard - Vessel Inspection Regulations
http://www.ecfr.gov/cgi-bin/ECFR?page=browse

U.S. Coast Guard - Vessel Traffic Services
https://www.navcen.uscg.gov/?pageName=vtsLocations

U.S. Coast Guard - Navigation Rules and Regulations
http://www.navcen.uscg.gov/?pageName=navRuleChanges

U.S. Army Corps of Engineers - Regulatory Policies
http://www.usace.army.mil/Missions/

U.S. Army Corps of Engineers - Vessel Transit Statics
http://www.navigationdatacenter.us/

U.S. Coast Guard Auxiliary Requirements for Recreational Boats
http://www.cgaux.org/boatinged/classes/2011/bss.php

Recreational Boating Safety - Accident Statistics
http://www.uscgboating.org/statistics/accident_statistics.php

National Oceanic and Atmospheric Administration, National Ocean Service
https://oceanservice.noaa.gov/

State Specific Boating Safety Requirements
http://www.americasboatingcourse.com/lawsbystate.cfm

Oil Company International Marine Forum (OCIMF)
https://www.ocimf.org/

Offshore Vessel Inspection Database (OVID)
https://www.ocimf-ovid.org/

Ship Inspection Report Program (SIRE)
https://www.ocimf.org/sire/

International Marine Contracting Association (IMCA) Standards
https://www.imca-int.com/

International Tanker Owners Pollution Federation (ITOP)
http://www.itopf.com/

International Convention of Standards of Training, Certification and Watchkeeping (STCW)
http://www.imo.org/en/About/conventions/listofconventions/pages/international-convention-on-standards-of-training,-certification-and-watchkeeping-for-seafarers-(stcw).aspx

**Appendix E**

## Abbreviations and Acronyms

| | |
|---|---|
| ACP | Area Contingency Plan |
| AIS | Automated Identification System |
| ANPRM | Advance Notice of Proposed Rulemaking |
| ATON | Aids to Navigation |
| BWI | Boating While Intoxicated |
| BTM | Broadcast Notice to Mariners |
| COTP | Captain of the Port |
| EPA | Environmental Protection Agency |
| MARAD | Maritime Administration |
| MTS | Marine Transportation System |
| MTSRU | Marine Transportation System Recovery Unit |
| NDG | National Dialogue Group |
| NEPA | National Environmental Policy Act |
| NMFS | National Marine Fisheries Service |
| NOAA | National Oceanic Atmospheric Administration |
| MAC | Mariners' Advisory Committee for the Bay & River Delaware |
| OSRO | Oil Spill Response Organization |
| PAWSA | Ports and Waterways Safety Assessment |
| PDF | Personal Flotation Device |
| PSC | Port State Control |
| PORTS | Physical Oceanographic Real-Time System |
| RNA | Regulated Navigation Areas |
| STCW | Standards of Training Certification of Watchkeeping |
| USACE | United States Army Corps of Engineers |
| USCG | United States Coast Guard |
| VHF | Very High Frequency |
| VMRS | Vessel Movement Reporting System |
| VTM | Vessel Traffic Management |
| VTS | Vessel Traffic Service |

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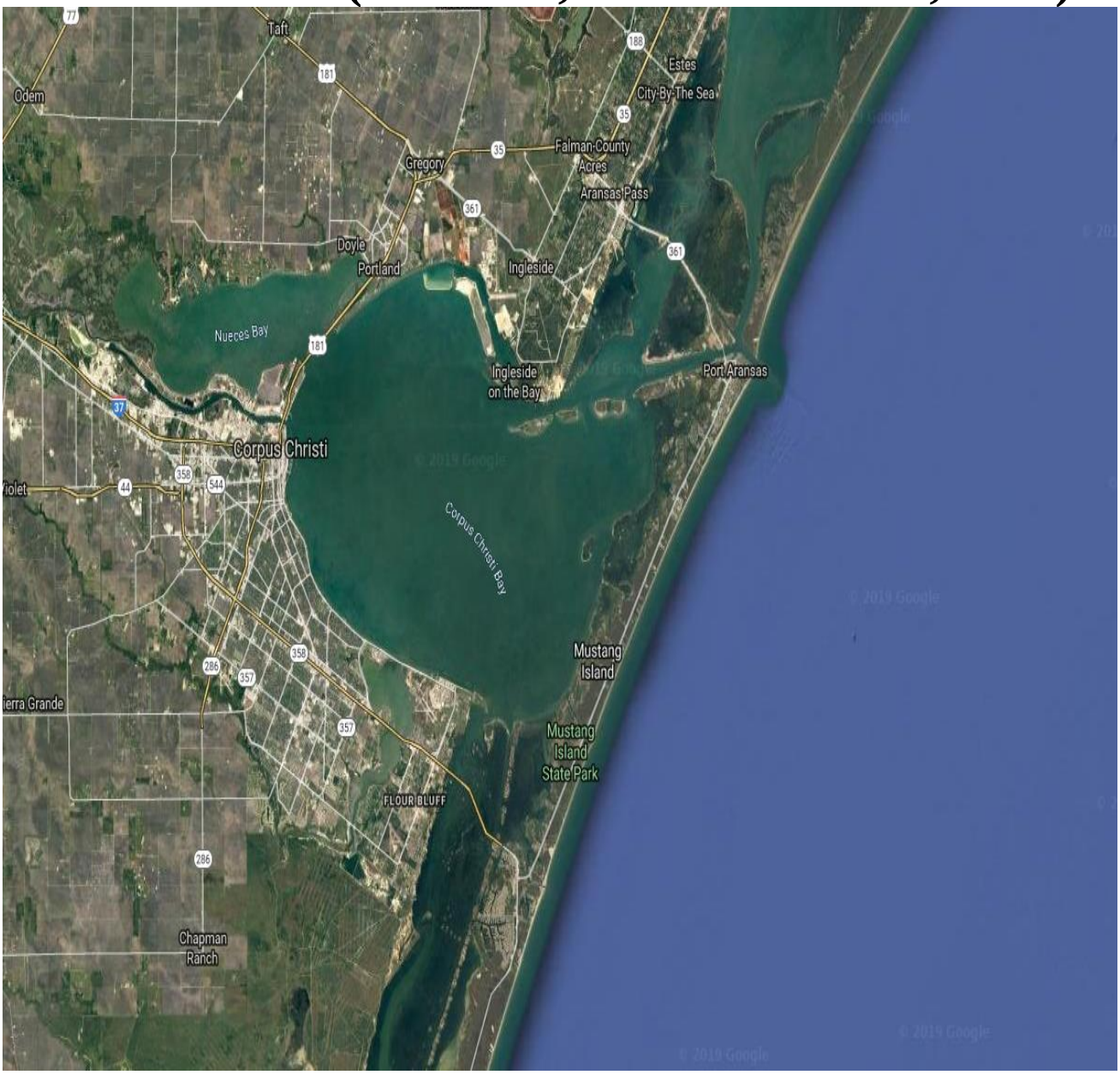
Appendix F

# CORPUS CHRISTI PORTS AND WATERWAY SAFETY ASSESSMENT (PAWSA)

## Traffic Statistics (June 15th, 2018 – June 15th, 2019)




**Prepared by the US Coast Guard Navigation Center**

# DESCRIPTION AND METHODOLOGY

## Traffic Data:

Traffic data in this report is from the Nationwide Automated Information System (NAIS) collected by the US Coast Guard. Maps were created in ArcMap 10.5.1 by the Navigation Center. The data covers the Corpus Christi Bay area. The intent of providing this data is to better inform discussion at the PAWSA workshop.

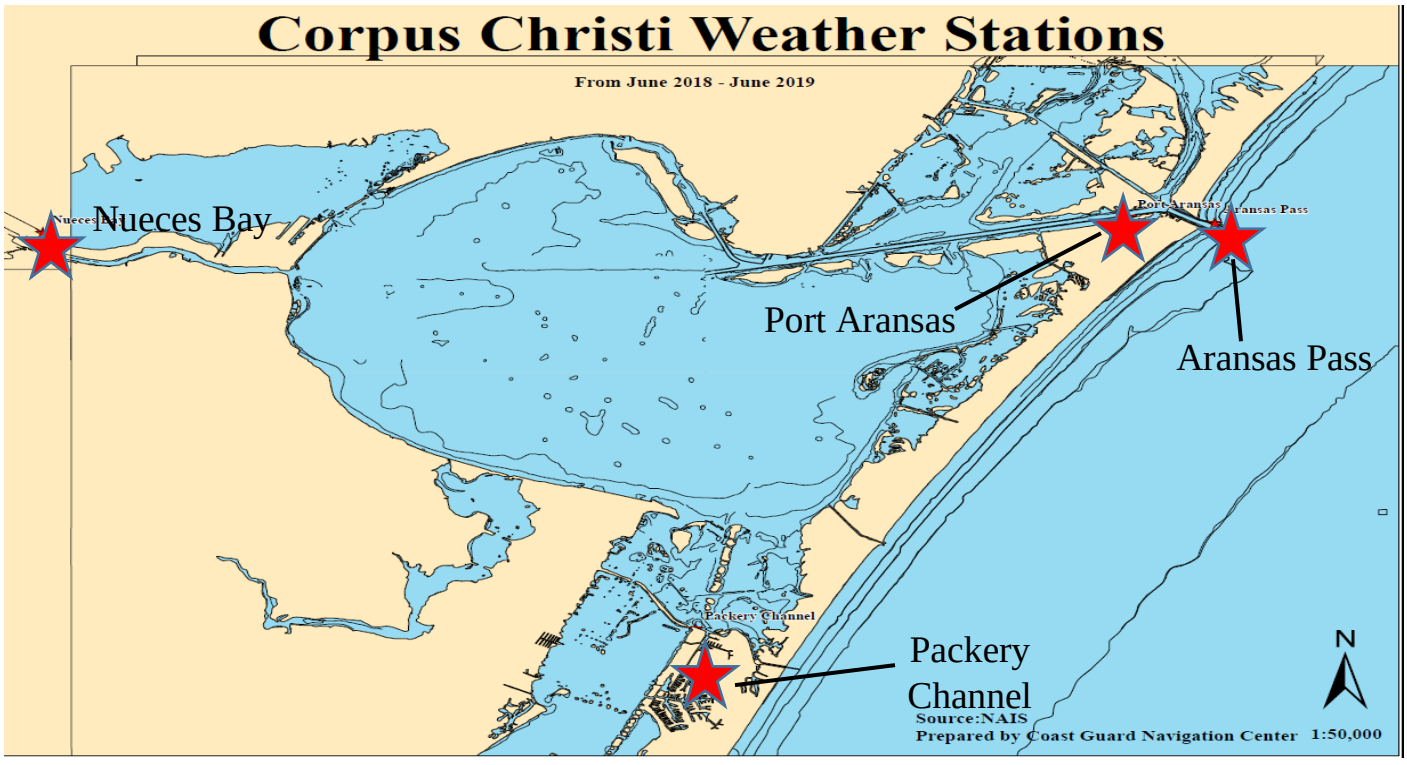
The heat maps starting on page six show all vessel traffic for the listed type over the course of a year. Densities are calculated by enumerating the length of transits per square mile $\frac{\text{Miles transited(year)}}{mile^2}$, and is represented on a blue, yellow, red scale where low density is blue and high density is red. The monthly summaries on page four and total transits data on page five can be used to compare traffic across vessel categories. A *transit* starts when a vessel enters the area and ends when the vessel is unmoving for 5 hours or turns off their AIS transponder. The line graphs on page five illustrate traffic volume for each month by vessel category and provides a sense of seasonal variation.

**The period of the vessel traffic data set is from June 15th, 2018 – June 15th, 2019. Therefore, the data presented for both June 2018 and June 2019 is for only half of each month.*

The category "Pleasure Craft and Other Vessels" *(see pages 4 and 5)* includes pleasure craft, sailing vessels, high-speed craft, search and rescue craft, law enforcement craft, and other unspecified ship types. However, it also includes vessels that are broadcasting either the incorrect AIS code or an unknown ship type AIS code, such as a "0". The "Other Commercial Vessels" category are ships transmitting ship type "Other" (90-99).

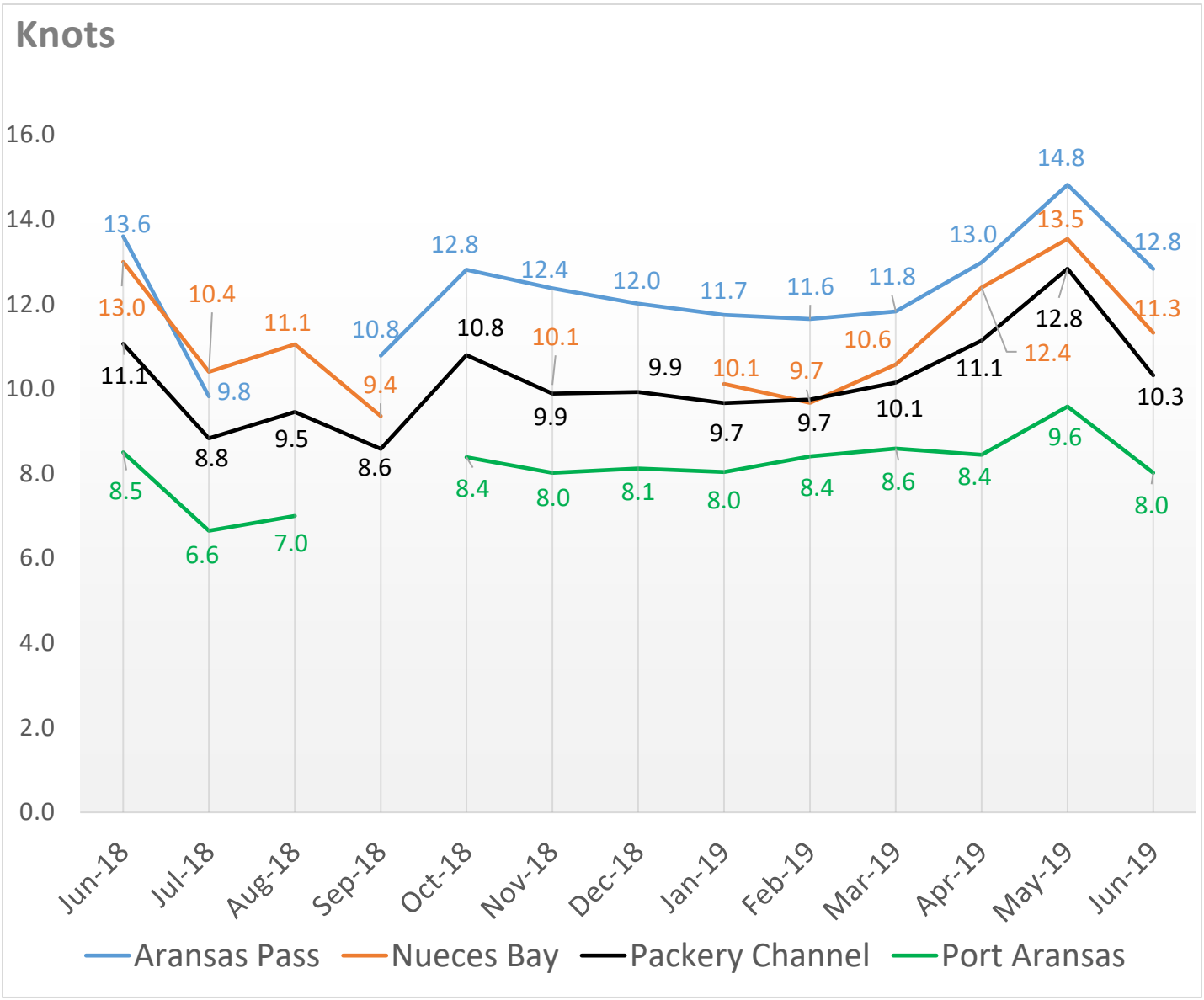
## Weather Data:

Weather data was downloaded from NOAA's National Data Buoy Center website (https://www.ndbc.noaa.gov/) for the four weather stations located at Aransas Pass, Nueces Bay, Port Aransas, and Packery Channel. This data range for weather pertains to the period from June 1st, 2018 – June 30th 2019.




For more information please contact:
LT Marcus Fair
Waterways Risk Assessment and Support Division
703-313-5873
marcus.l.fair@uscg.mil

# Monthly Average Wind Speed




The graph above plots the monthly averages of wind speed (knots) for each of the four stations. Each weather station records and stores wind speed data in 8-10 minute aggregates for each month. Note that for three of the weather stations, wind speed data was not available for four different months, hence the break in each line. The Aransas Pass station had no data available for August 2018. Nueces Bay showed no available data for October 2018 and December 2018. The Port Aransas weather station showed no data for September 2018. Lastly, the tables on the following page break out the number of days in each month in which the wind speed was measured to have exceeded 20 knots at each station.

## Aransas Pass

| Month | No. of Days Wind Speed > 20 Knots |
|---|---|
| June 18’ | 12 |
| July 18’ | 3 |
| August 18’ | Data Not Available |
| September 18’ | 7 |
| October 18’ | 17 |
| November 18’ | 15 |
| December 18’ | 14 |
| January 19’ | 15 |
| February 19’ | 11 |
| March 19’ | 10 |
| April 19’ | 12 |
| May 19’ | 20 |
| June 19’ | 15 |
| **Total** | **151** |

## Nueces Bay

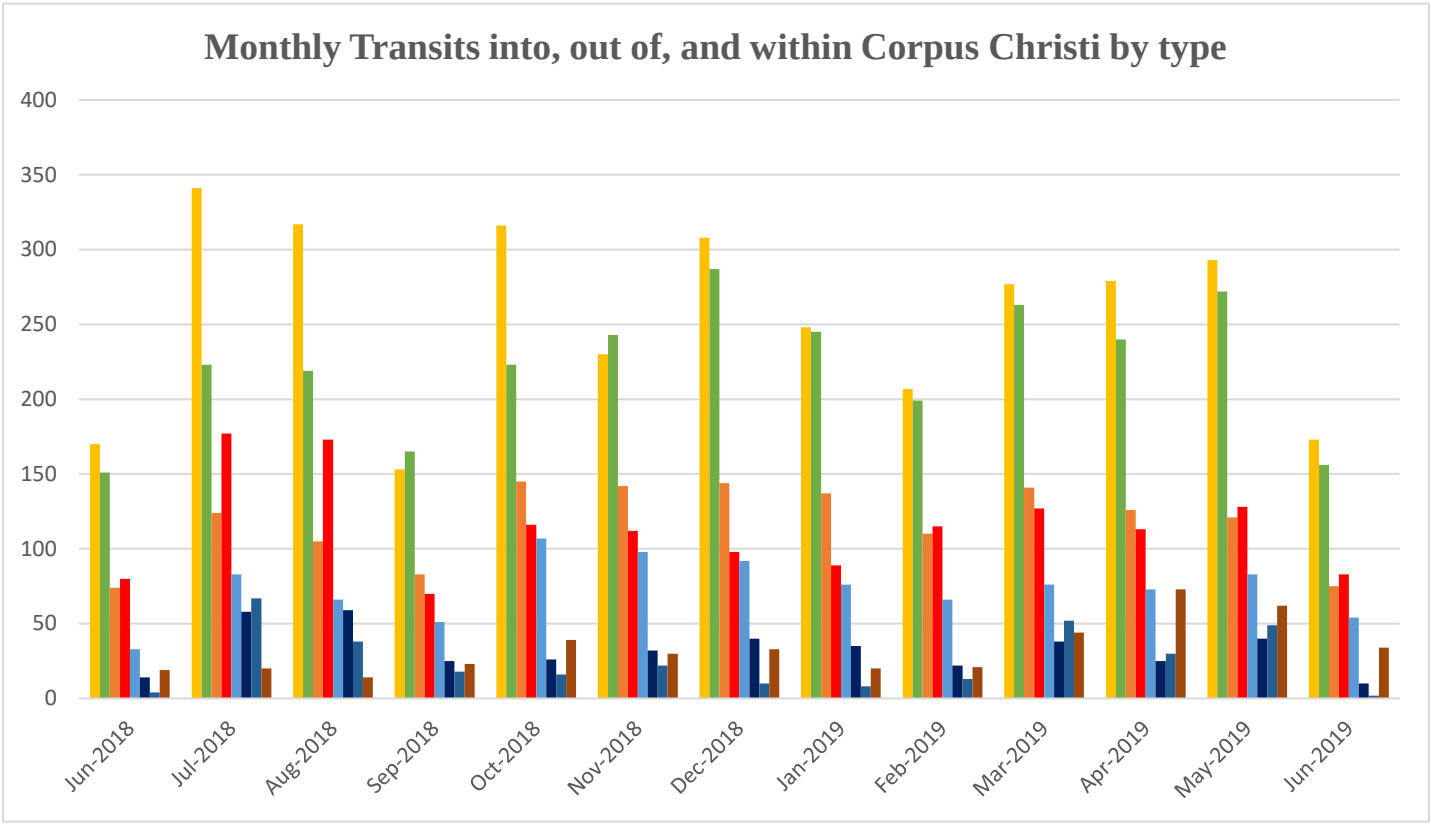
| Month | No. of Days Wind Speed > 20 Knots |
|---|---|
| June 18’ | 18 |
| July 18’ | 4 |
| August 18’ | 15 |
| September 18’ | 13 |
| October 18’ | Data Not Available |
| November 18’ | 6 |
| December 18’ | Data Not Available |
| January 19’ | 7 |
| February 19’ | 3 |
| March 19’ | 13 |
| April 19’ | 15 |
| May 19’ | 18 |
| June 19’ | 8 |
| **Total** | **120** |

## Packery Channel

| Month | No. of Days Wind Speed > 20 Knots |
|---|---|
| June 18’ | 6 |
| July 18’ | 0 |
| August 18’ | 1 |
| September 18’ | 4 |
| October 18’ | 5 |
| November 18’ | 9 |
| December 18’ | 9 |
| January 19’ | 10 |
| February 19’ | 7 |
| March 19’ | 4 |
| April 19’ | 7 |
| May 19’ | 14 |
| June 19’ | 5 |
| **Total** | **81** |

## Port Aransas

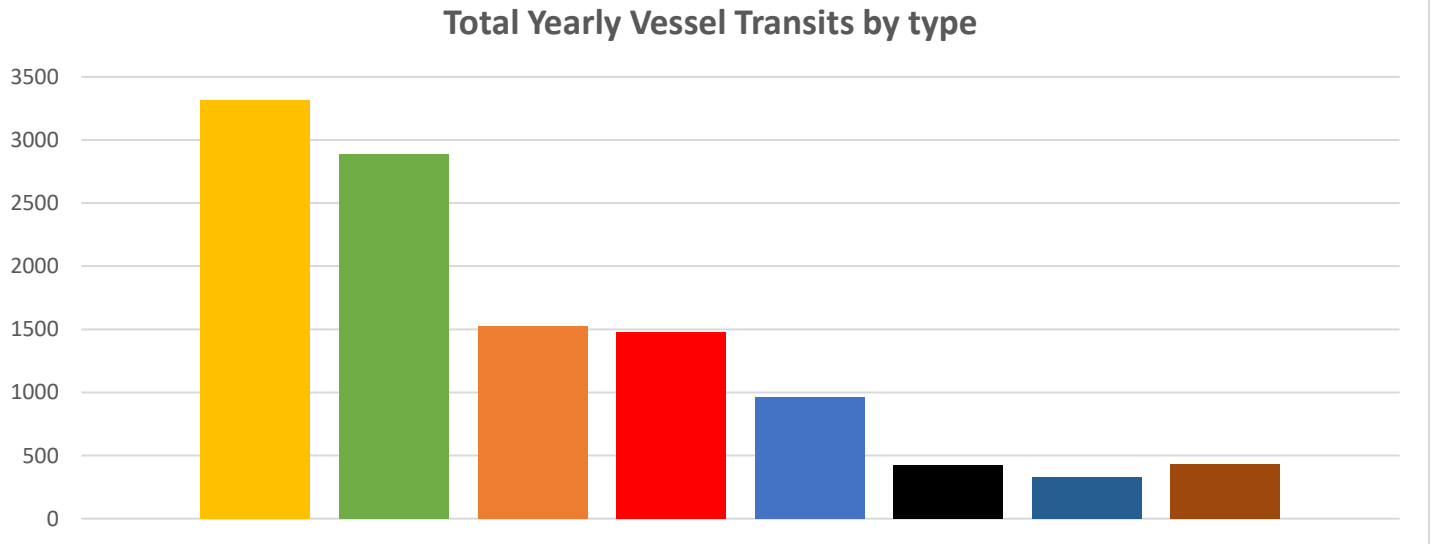
| Month | No. of Days Wind Speed > 20 Knots |
|---|---|
| June 18’ | 0 |
| July 18’ | 0 |
| August 18’ | 0 |
| September 18’ | Data Not Available |
| October 18’ | 3 |
| November 18’ | 6 |
| December 18’ | 4 |
| January 19’ | 5 |
| February 19’ | 4 |
| March 19’ | 7 |
| April 19’ | 3 |
| May 19’ | 3 |
| June 19’ | 2 |
| **Total** | **37** |




| | |
|---|---|
| Pleasure Craft & Other Vessels | 29% |
| Tugs and Towing Vessels | 25% |
| Tankers | 13% |
| Passenger Vessels | 13% |
| Vessels Over 1600 GRT* | 8% |
| Cargo Vessels | 4% |
| Fishing Vessels | 3% |
| Other Commercial Vessels | 4% |

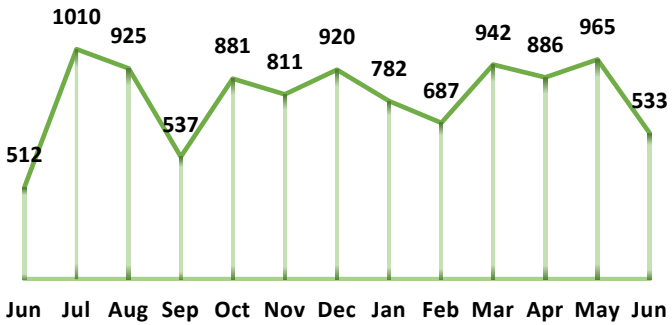
*Vessels over 1600GRT are also included in other categories based on type.

Traffic statistics come from the same NAIS data. Vessel type is user defined. Vessel tonnage was determined by registered tonnage of each vessel's Maritime Mobile Service Identity (MMSI). The category "Vessels over 1600 GRT" applies to vessels of this tonnage spanning all categories.

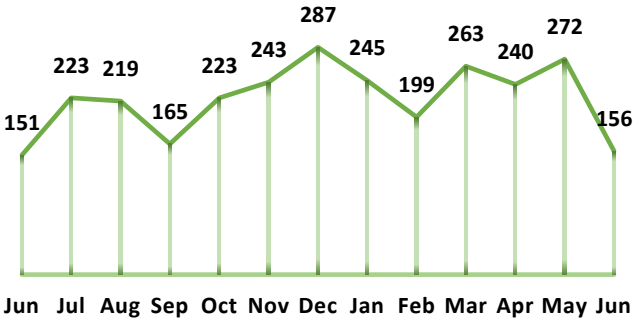


# Total Transits per Vessel Type

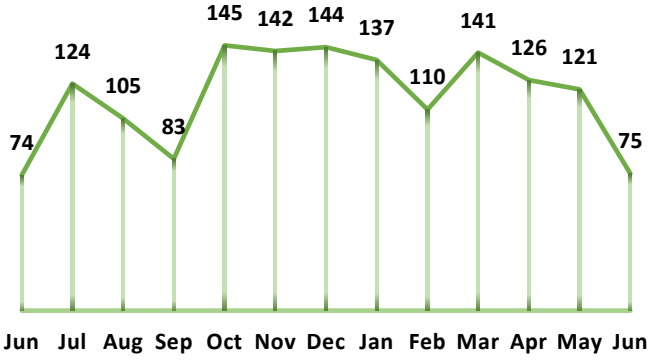
## All Vessels: 10,391



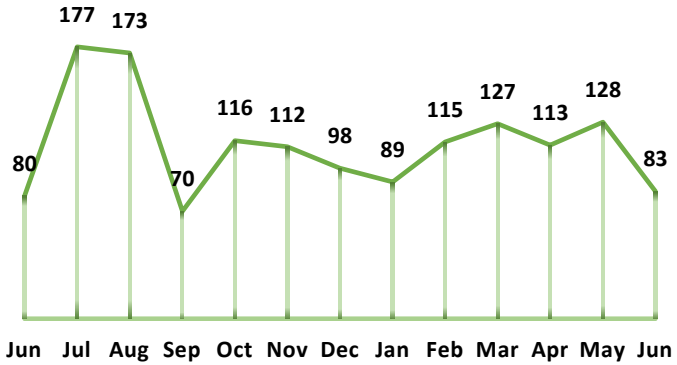

## Tug & Tow Vessels: 2,886



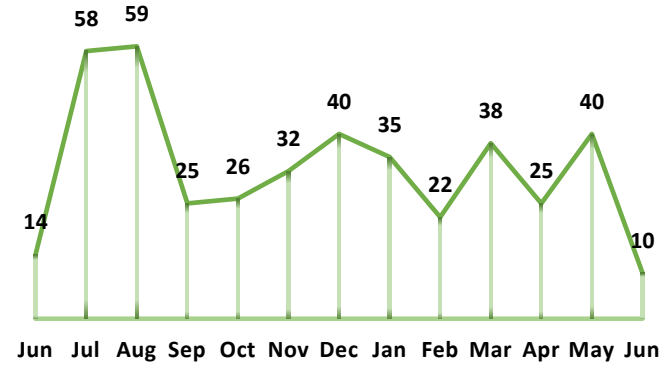

## Tanker Vessels: 1,527



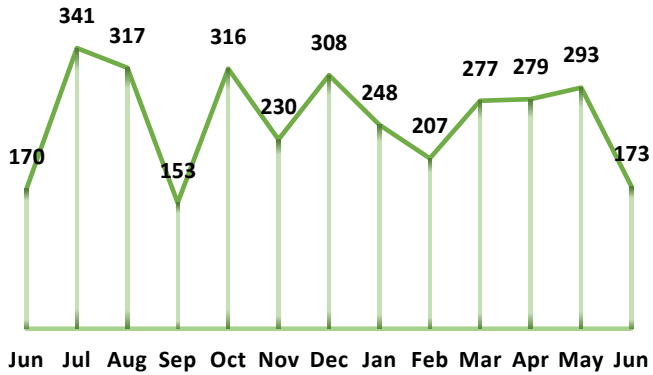

## Passenger Vessels: 1,481



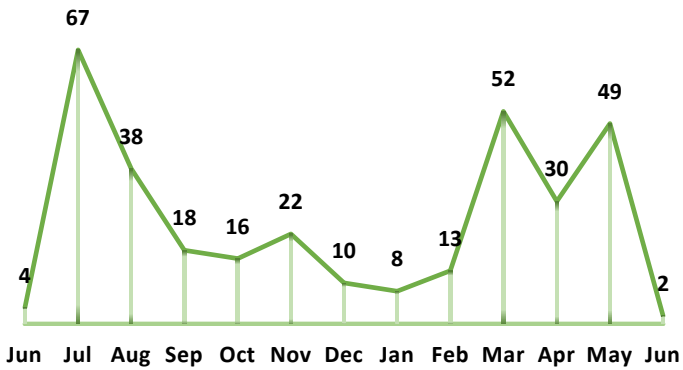

## Cargo Vessels: 424



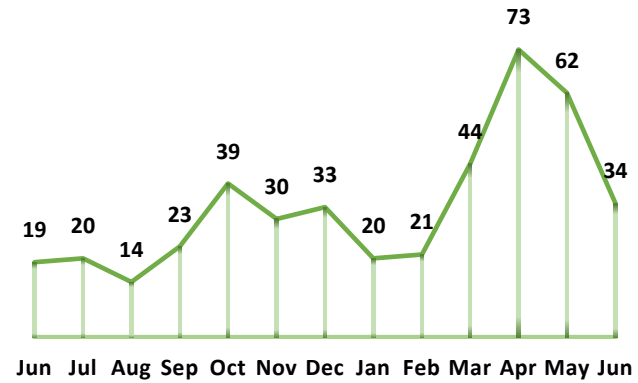

## Pleasure Craft and Others: 3,312



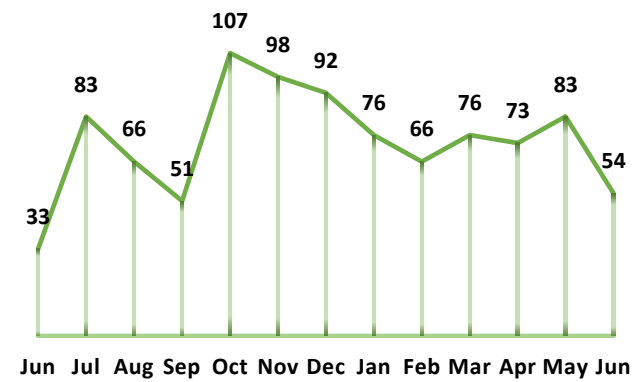

## Fishing Vessels: 329




## Other Commerical Vessels: 432

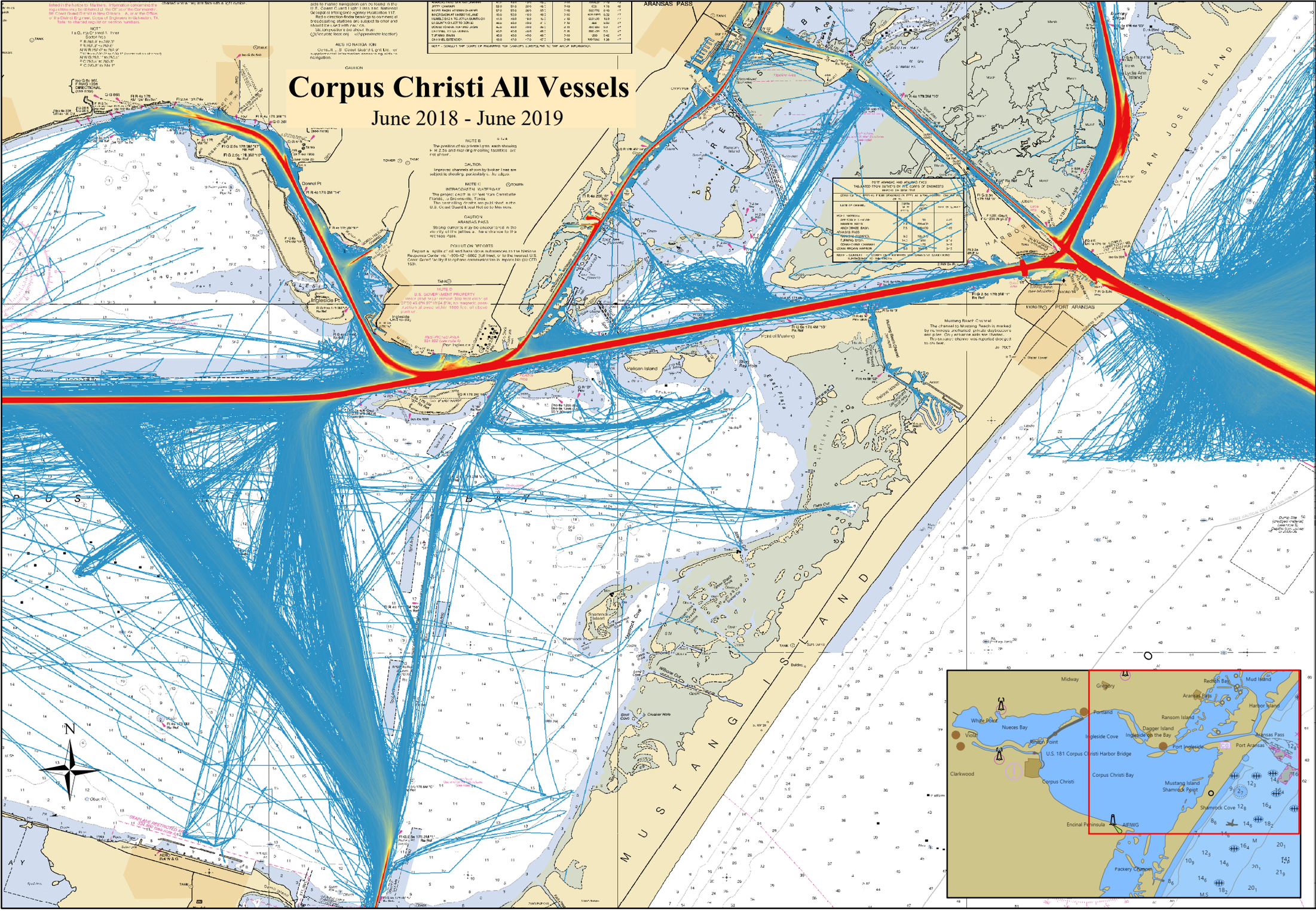



## 1600T Vessels: 958*See note above



# Corpus Christi All Vessels

June 2018 - June 2019




**All Vessels**

**Value**

High Track Density

Low Track Density

1:114,708

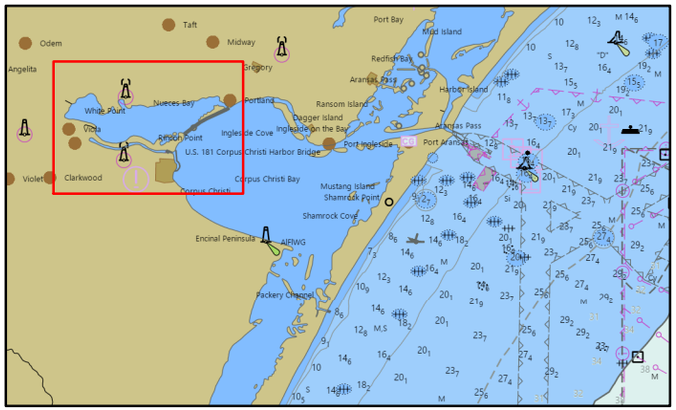
0 0.5 1 2 3 4 Nautical Miles

Coordinate System: GCS WGS 1984
Datum: WGS 1984
Units: Degree

Data Source: NAIS
Prepared by Coast Guard Navigation Center

# Corpus Christi All Vessels

June 2018 - June2019







**All Vessels**

**Value**

High Track Density

Low Track Density

1:100,000

0 0.5 1 2 3 4

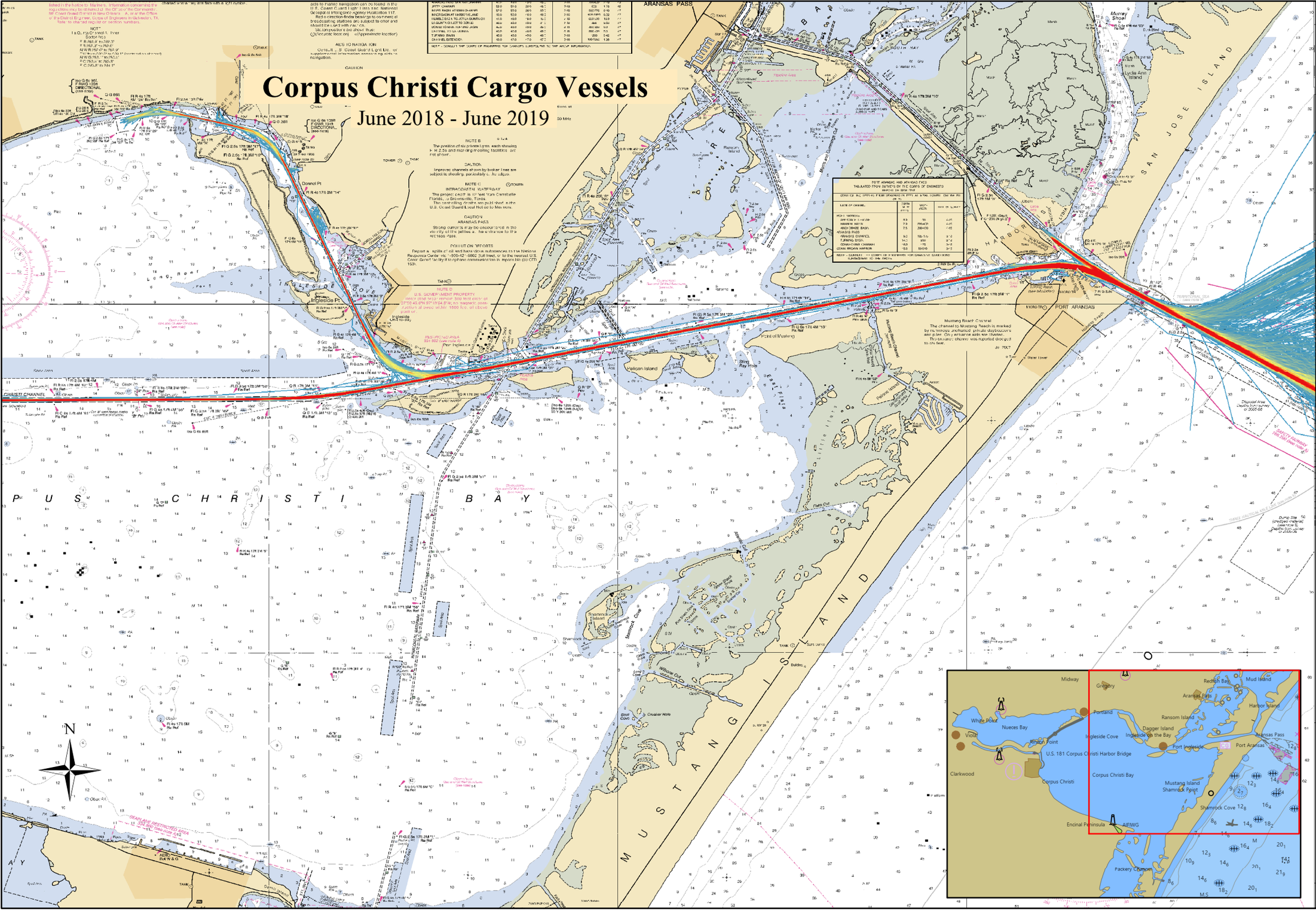
Nautical Miles

Coordinate System: GCS WGS 1984
Datum: WGS 1984
Units: Degree

Data Source: NAIS
Prepared by Coast Guard Navigation Center

# Corpus Christi Cargo Vessels

June 2018 - June 2019




**Cargo Vessels**

**Value**

High Track Density

Low Track Density

1:114,708

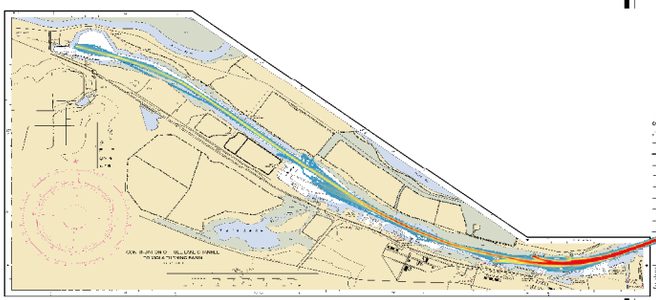
0 0.5 1 2 3 4 Nautical Miles

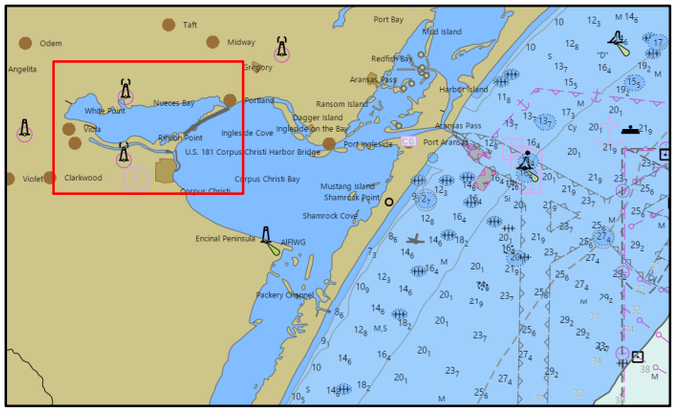
Coordinate System: GCS WGS 1984
Datum: WGS 1984
Units: Degree

Data Source: NAIS
Prepared by Coast Guard Navigation Center

# Corpus Christi Cargo Vessels

June 2018 - June2019









**Cargo Vessels**

**Value**

High Track Density

Low Track Density

1:100,000

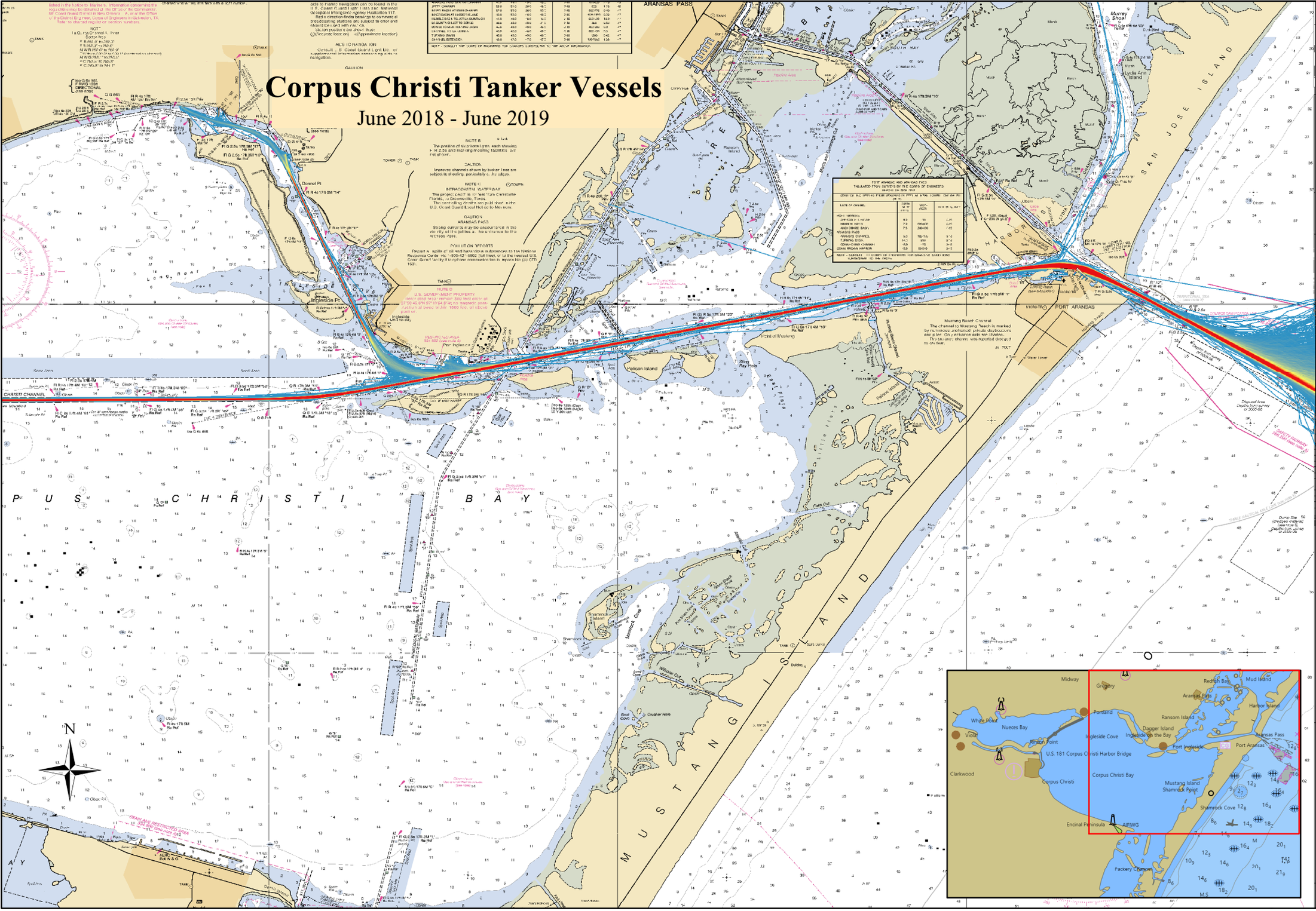
0 0.5 1 2 3 4 Nautical Miles

Coordinate System: GCS WGS 1984
Datum: WGS 1984
Units: Degree

Data Source: NAIS
Prepared by Coast Guard Navigation Center

# Corpus Christi Tanker Vessels

June 2018 - June 2019




**Tanker Vessels**

**Value**

High Track Density

Low Track Density

1:114,708

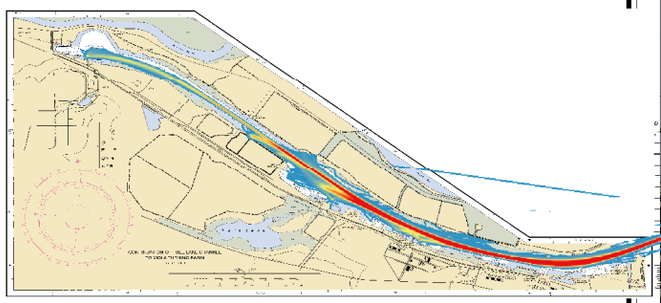
0 0.5 1 2 3 4 Nautical Miles

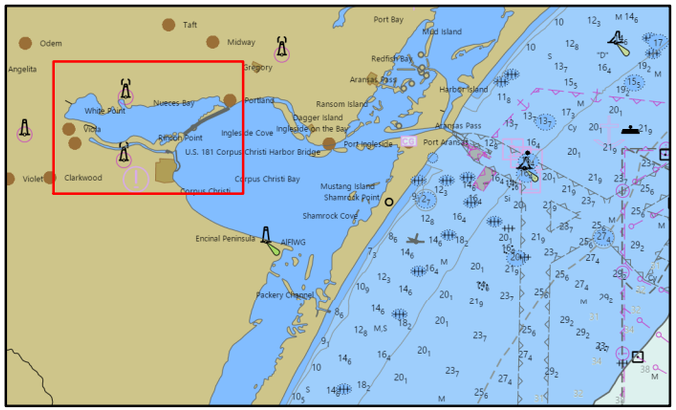
Coordinate System: GCS WGS 1984
Datum: WGS 1984
Units: Degree

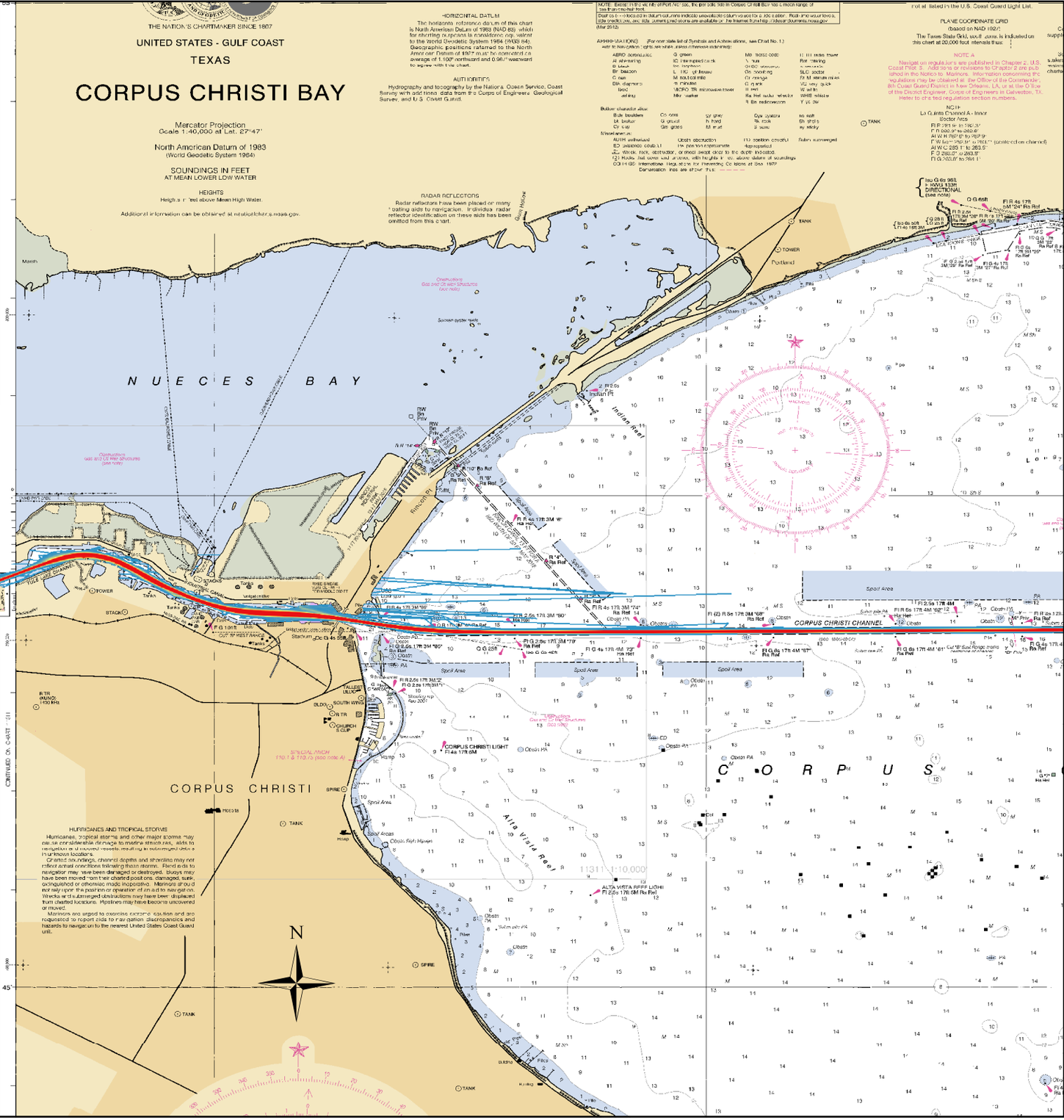
Data Source: NAIS
Prepared by Coast Guard Navigation Center

# Corpus Christi Tanker Vessels

June 2018 - June2019






**Tanker Vessels**

**Value**

High Track Density

Low Track Density

1:100,000

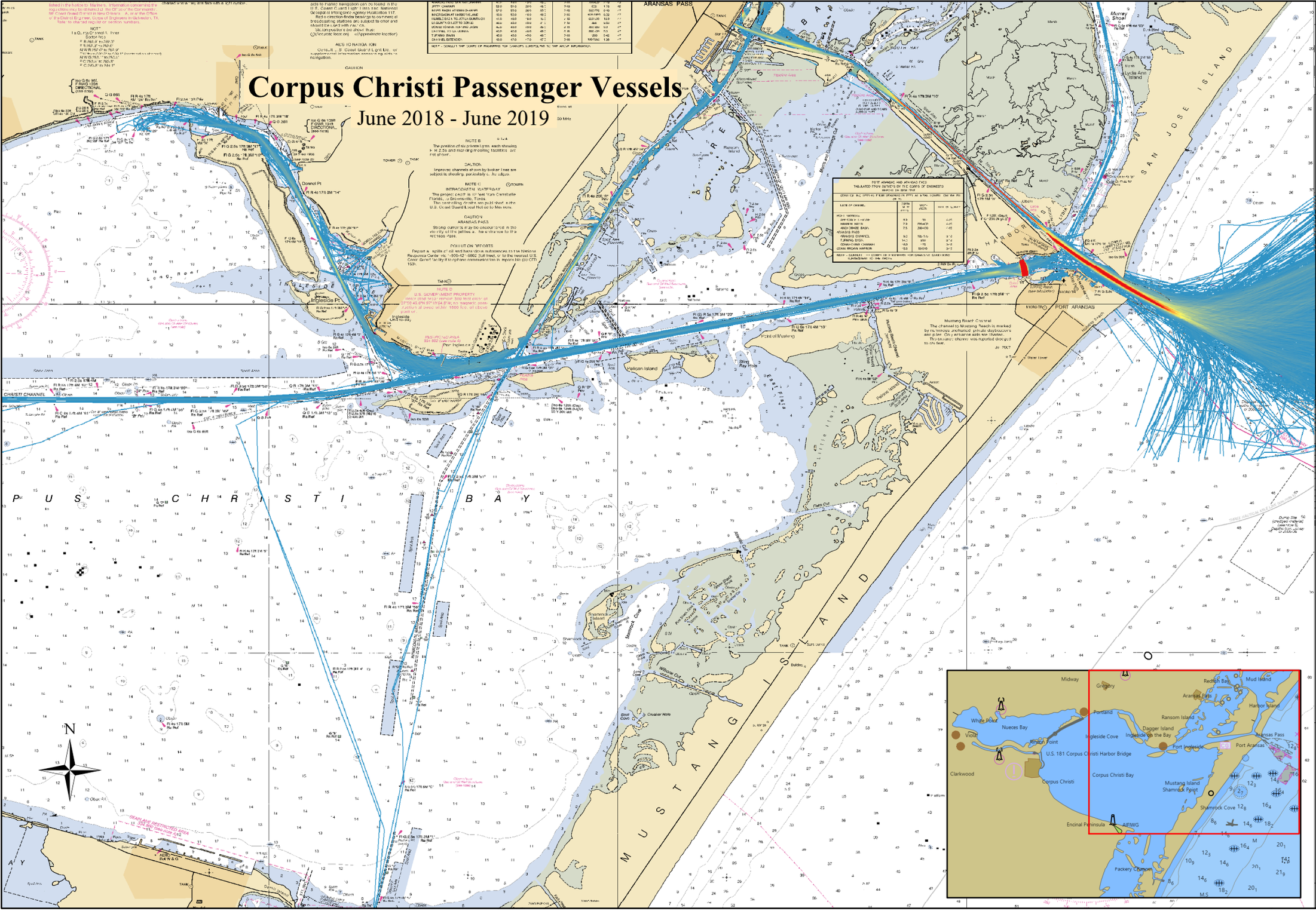
0 0.5 1 2 3 4 Nautical Miles

Coordinate System: GCS WGS 1984
Datum: WGS 1984
Units: Degree

Data Source: NAIS
Prepared by Coast Guard Navigation Center

# Corpus Christi Passenger Vessels

June 2018 - June 2019




**Passenger Vessels**

**Value**

High Track Density

Low Track Density

1:114,708

0 0.5 1 2 3 4

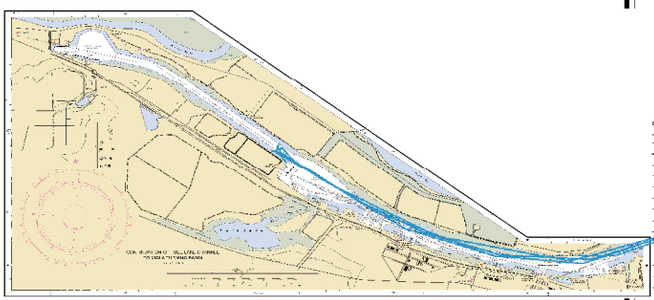
Nautical Miles

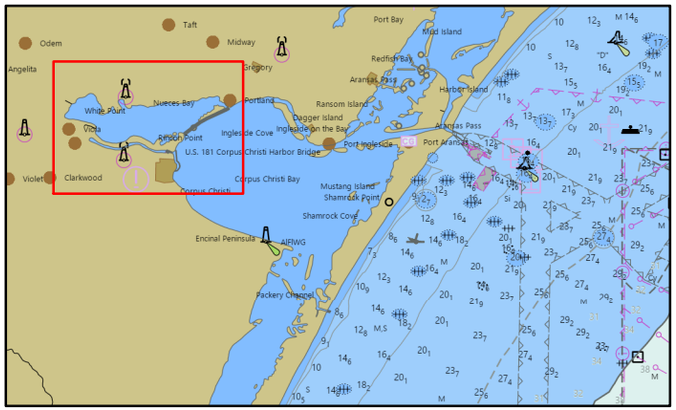
Coordinate System: GCS WGS 1984
Datum: WGS 1984
Units: Degree

Data Source: NAIS
Prepared by Coast Guard Navigation Center

# Corpus Christi Passenger Vessels

June 2018 - June2019









**Passenger Vessels**

**Value**

High Track Density

Low Track Density

1:100,000

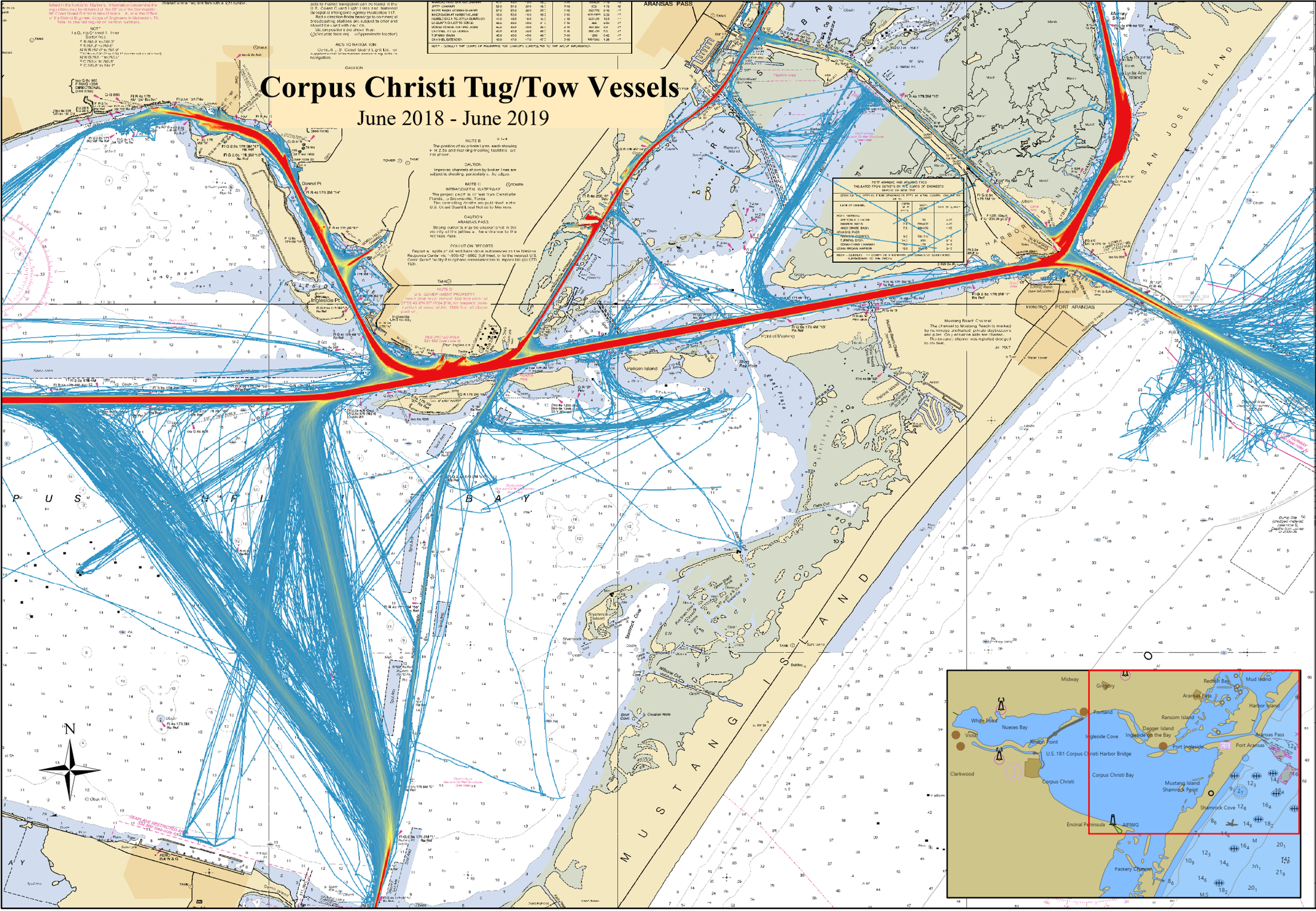
0 0.5 1 2 3 4 Nautical Miles

Coordinate System: GCS WGS 1984
Datum: WGS 1984
Units: Degree

Data Source: NAIS
Prepared by Coast Guard Navigation Center

# Corpus Christi Tug/Tow Vessels

June 2018 - June 2019




**Tug/Tow Vessels**

**Value**

High Track Density

Low Track Density

1:114,708

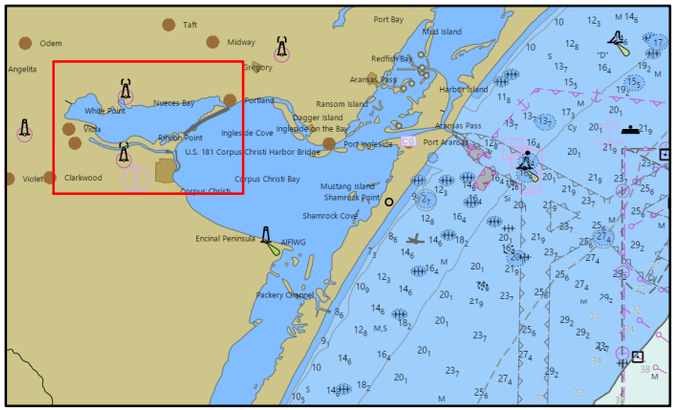
0 0.5 1 2 3 4 Nautical Miles

Coordinate System: GCS WGS 1984
Datum: WGS 1984
Units: Degree

Data Source: NAIS
Prepared by Coast Guard Navigation Center

# Corpus Christi Tug/Tow Vessels

June 2018 - June2019







**Tug/Tow Vessels**

**Value**

High Track Density

Low Track Density

1:100,000

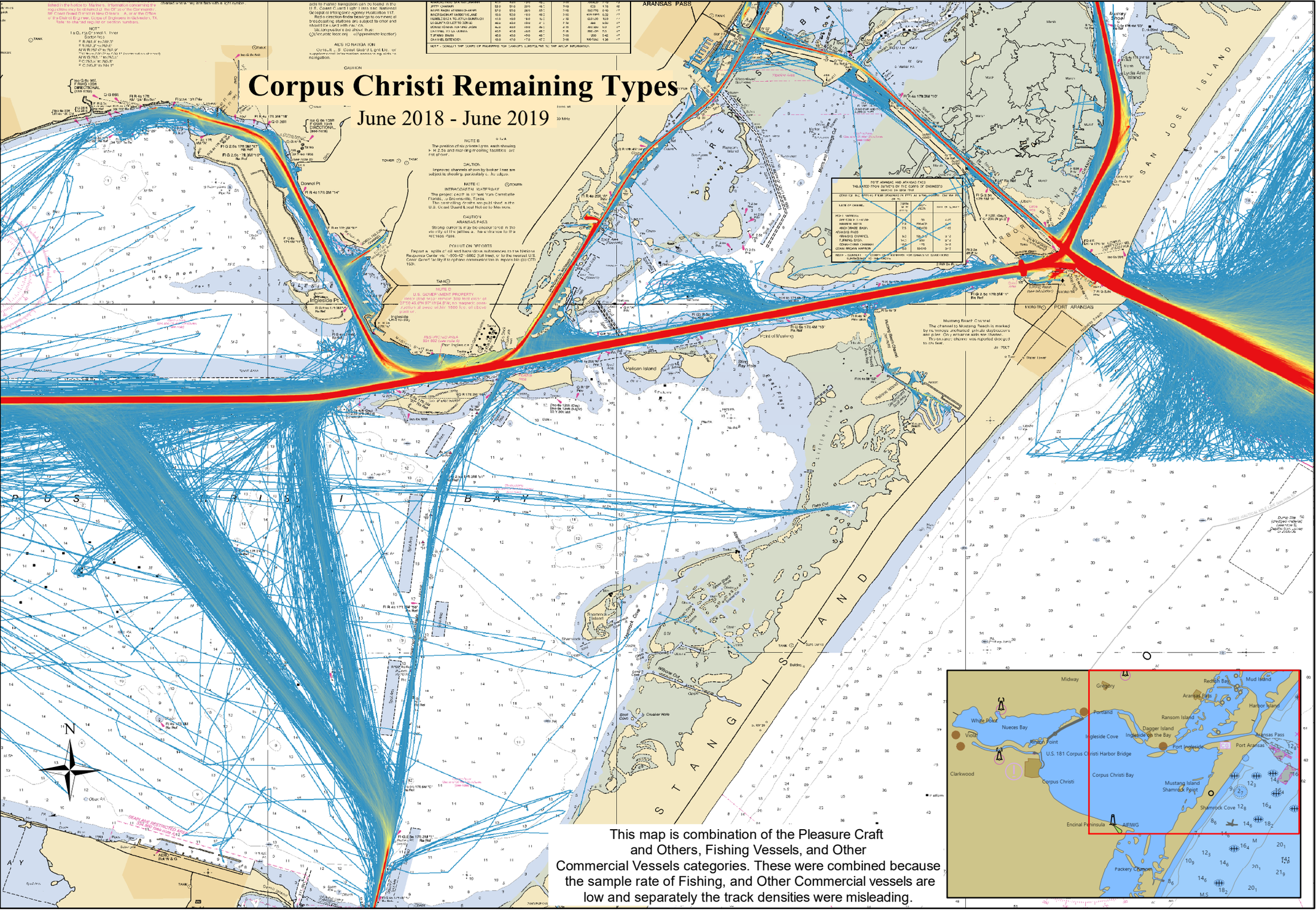
0 0.5 1 2 3 4 Nautical Miles

Coordinate System: GCS WGS 1984
Datum: WGS 1984
Units: Degree

Data Source: NAIS
Prepared by Coast Guard Navigation Center

# Corpus Christi Remaining Types

June 2018 - June 2019




This map is combination of the Pleasure Craft and Others, Fishing Vessels, and Other Commercial Vessels categories. These were combined because the sample rate of Fishing, and Other Commercial vessels are low and separately the track densities were misleading.

**Pleasure, Sailing, Fishing, Other, and Type N/A Vessels**

Value

High Track Density

Low Track Density

1:114,708

0 0.5 1 2 3 4 Nautical Miles

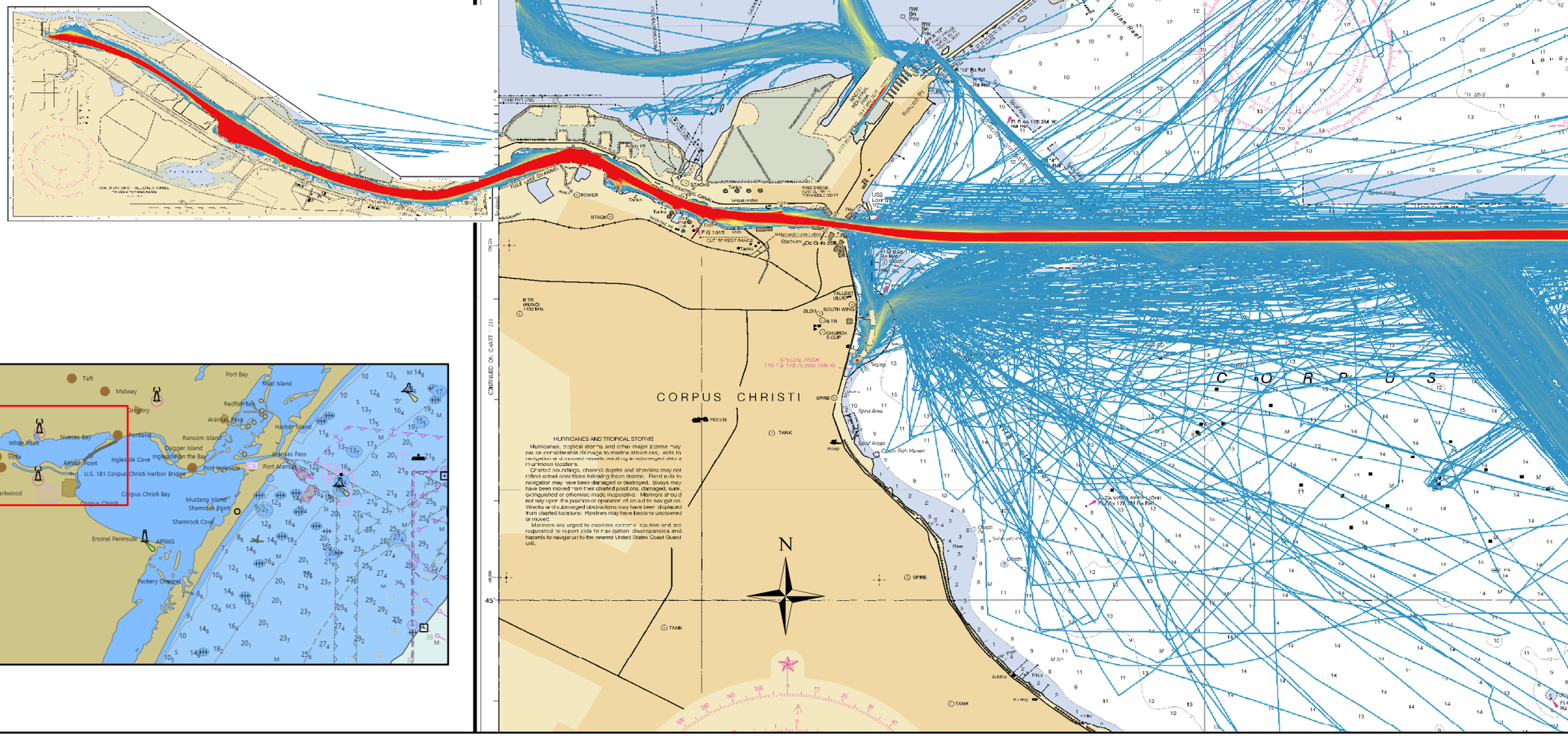
Coordinate System: GCS WGS 1984
Datum: WGS 1984
Units: Degree

Data Source: NAIS
Prepared by Coast Guard Navigation Center

# Corpus Christi Remaining Types

June 2018 - June2019

This map is combination of the Pleasure Craft and Others, Fishing Vessels, and Other Commercial Vessels categories. These were combined because the sample rate of Fishing, and Other Commercial vessels are low and separately the track densities were misleading.




**Pleasure, Sailing, Fishing, Other, and Type N/A Vessels**

Value

High Track Density

Low Track Density

1:100,000

0 0.5 1 2 3 4 Nautical Miles

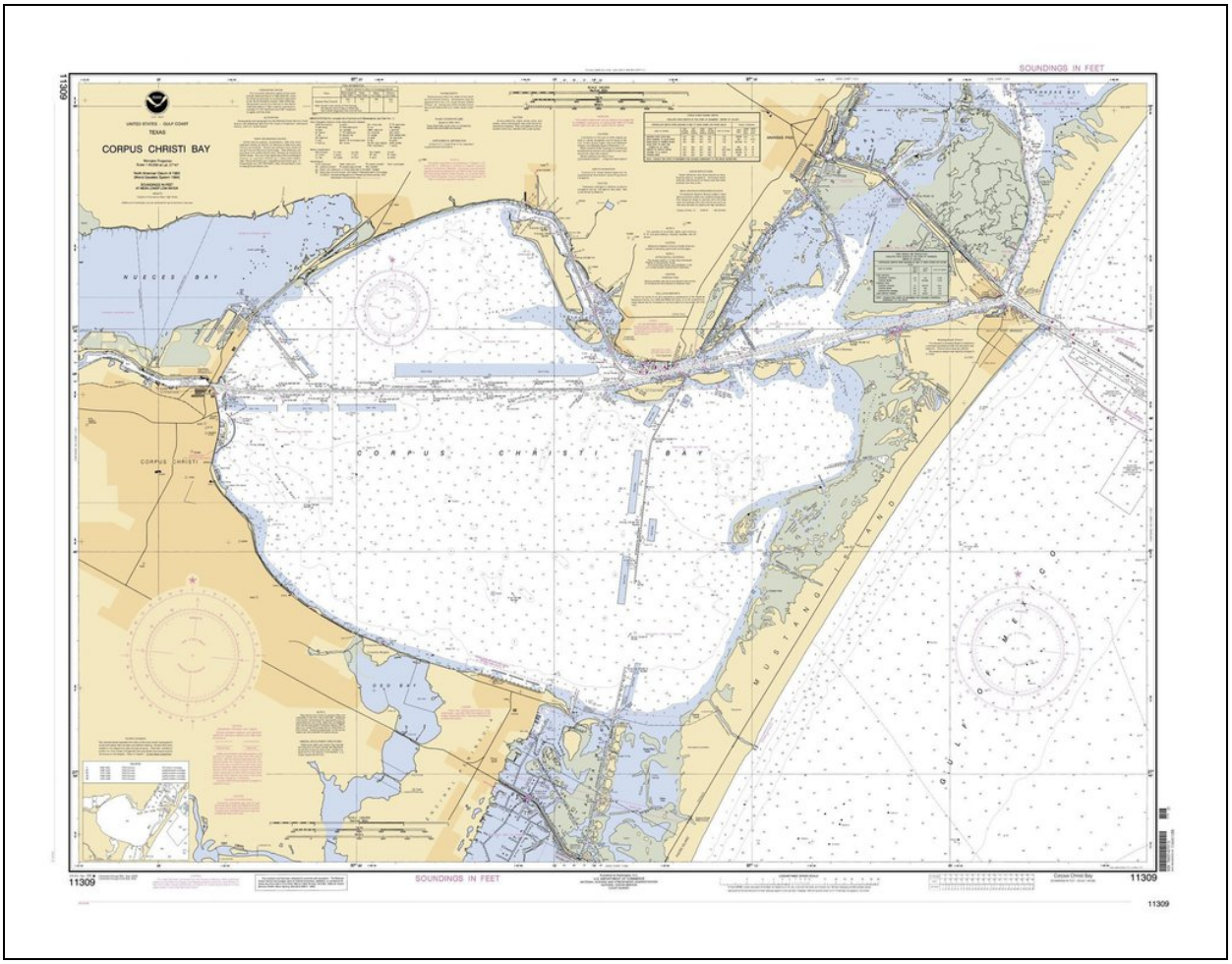
Coordinate System: GCS WGS 1984
Datum: WGS 1984
Units: Degree

Data Source: NAIS
Prepared by Coast Guard Navigation Center

**Appendix G**

# Corpus Christi Waterway Profile Information
# Coast Guard Sector/ Air Station Corpus Christi (2019)

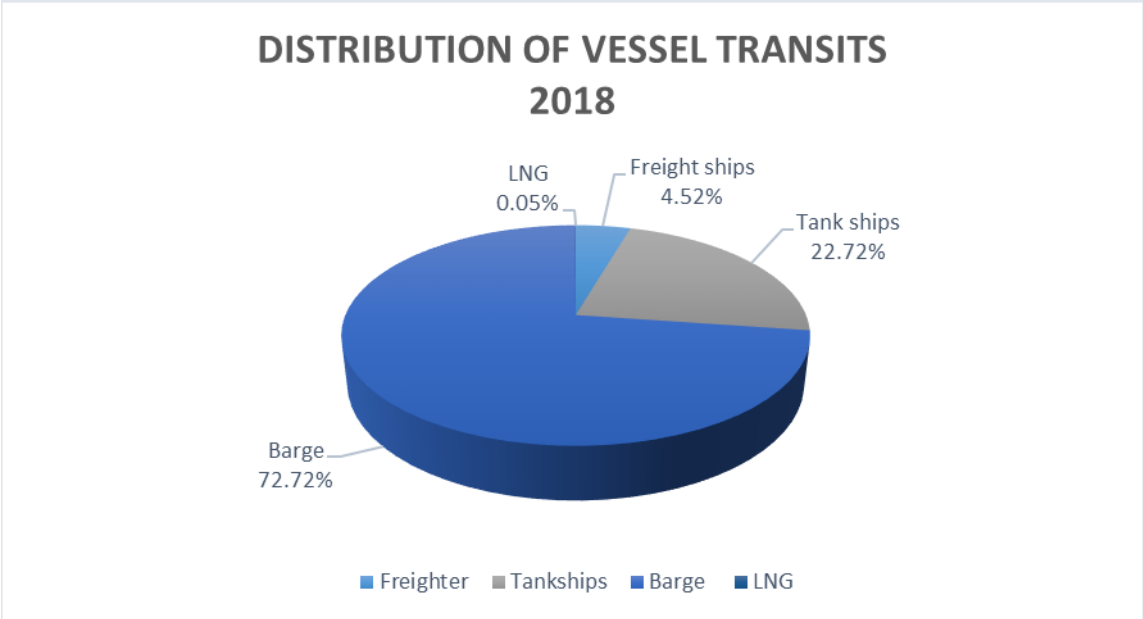
***Corpus Christi and La Quinta Ship Channels:***




*Distributions of Corpus Christi and La Quinta Channel Activity by Vessel Type*

A broad array of vessel movements and activities occur daily on US waterways without the Coast Guard's specific review and approval. While the movement of non-exempted large commercial ships requires reporting (33 CFR 160, Subpart C), the Coast Guard does not have legal authority to require reporting or otherwise collect information regarding the movement of recreational vessels (powered and human paddle craft), uninspected and inspected small passenger vessels, fixed route ferries, tug and barges transiting domestically, and certain other vessel transits.

The Port of Corpus Christi Authority is able to provide some information regarding commercial vessel transits. [1]This data indicates that commercial vessels navigating the Corpus Christi and La Quinta Channel primarily consist of barges carrying liquid and dry cargo, oil and chemical tankships, and freight ships carrying bulk and break bulk cargo. (POCCA)




*Towing vessel that are not transporting cargo (tow assist) are not captured in this data.

*Waterway Navigational Attributes*

[1] LNG facilities started receiving vessels in November 2018 which accounts for the small percentage of vessels in the chart.

- **Traffic:** Approximately 6,200 commercial vessel movements are recorded each year in the Corpus Christi and La Quinta Ship Channels. Vessel traffic consists of deep draft vessels and barges, both ocean going and inland, with the majority of the traffic coming from inland liquid barges. Recreational vessels and commercial fishing vessels use the waterway but are restricted from entering the Inner Harbor because of a permanently established security zone. There is also a permanently established safety zone around loaded liquefied petroleum gas vessels transiting the Corpus Christi and La Quinta Ship Channels. It has been noted that the area of the Harbor Island intersection and the La Quinta junction are the most hazardous areas for vessel traffic. (POCCA); (ACCP)

- **Wind**: Prevailing winds blow in a southeastern direction during most months except for the months between November through January when winds are also seen coming from the north to northeastern direction. Average wind speeds fall between 9 to 12 mph for Ingleside, Nueces Bay, and Port Aransas, with stronger winds seen in Aransas Pass where wind speed average is 14 mph (Iowa State University, Iowa Environmental Mesonet).

- **Visibility Restrictions:** Fog conditions account for all phenonema that restrict visibility in this port. A chart has been enclosed at the end of this document as image A-1.

- **Visibility Impediments:** None were noted upon inquiry.

- **Water Movement:** Currents at times have velocities exceeding 2.5 knots in Aransas Pass and are greatly influenced by winds. It is reported that the currents outside arasas Pass are variable. South-bound currents when reinforced by northerly winds have produced a drift that has been reported as high as four knots across the mouth of the jetties (U.S. Coast Pilots 5, chapter 11).

- **Obstructions:** None were noted upon inquiry.

- **Dimensions:** The Corpus Christi Ship Channel is 29.4 miles long and consists of the Entrance/Jetty Channel (3.9miles long and 49ft MLLW), the Lower Bay Reach (8.6 miles long, 500ft wide, and 47ft MLLW), the Upper Bay Reach (9.6 miles, 400ft wide, and 47ft MLLW), and the Inner Harbor (7.3 miles, 300-800ft wide, and 47ft MLLW). A bridge spans the entrance to the Inner Harbor narrowing the width to 300ft and having a vertical clearance of 137.5ft at mean high water. Following the entrance the Corpus Christi turning basin widens to 800ft then the Inner Harbor narrows again to 400ft and then 300ft. The La Quinta Ship Channel is 5.9 miles long, 400ft wide, and 47ft MLLW. (USACE Galveston District Summer Stakeholder Partnering Forum)

- **Bottom Type:** The primary bottom types of the Corpus Christi and La Quinta ship channels are sand and silt with small amounts of shale. (USACE Corpus Christi Resident Area Office)

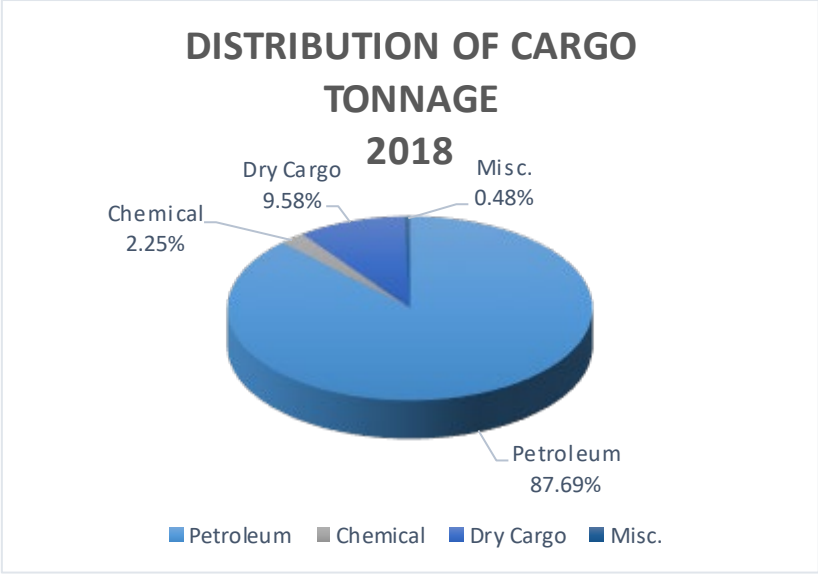
- **Waterway Configuration:** See the graphic depicting the Port of Corpus Christi highlighting the Corpus Christi and La Quinta Ship Channels located in the participant folder.

- **Number of Passengers Vessels:** There are no passenger vessel facilities in the Corpus Christi or La Quinta Ship Channels. There is a small ferry that transports passengers and vehicles from Aransas Pass to Port Aransas as well as several sightseeing and charter fishing vessels that operate in the area. (USCG)
- **Volume of Petroleum:** In 2018 the Port of Corpus Christi Authority reports 93,160,273 sh. t. of petroleum products were transported to and from the port by both vessels and barges. This number includes crude oil which accounts for approximately 49% of the total volume of petroleum products transported. Approximately 81% of all petroleum products, including crude oil, are transported into and out of the Inner Harbor. (POCCA)
- **Volume of Chemicals:** In 2018 the Port of Corpus Christi Authority reports 2,385,421 short tons of chemical products were transported to and from the port by both vessels and barges. Caustic Soda, Hydrochloric Acid, Perchloroethylene, Vinyl Chloride, and Carbon Tetrachloride are all chemicals being transported in bulk. Approximately 95% of all chemicals are transported into and out of the La Quinta Ship Channel. (POCCA)
- **Mobility:** The Port of Corpus Christi is the 4th largest port in the U.S. in total tonnage and a leader in U.S. Crude Oil exports. With the majority of the petroleum products entering and leaving the Inner Harbor any marine incident involving the closure of the harbor would have significant economic impacts. Furthermore, any incident involving the closure or obstruction of Aransas Pass would cause substantial complications as this is the only way for deep draft vessels to enter the port. (USCG)

*Distribution of Cargo Tonnage*

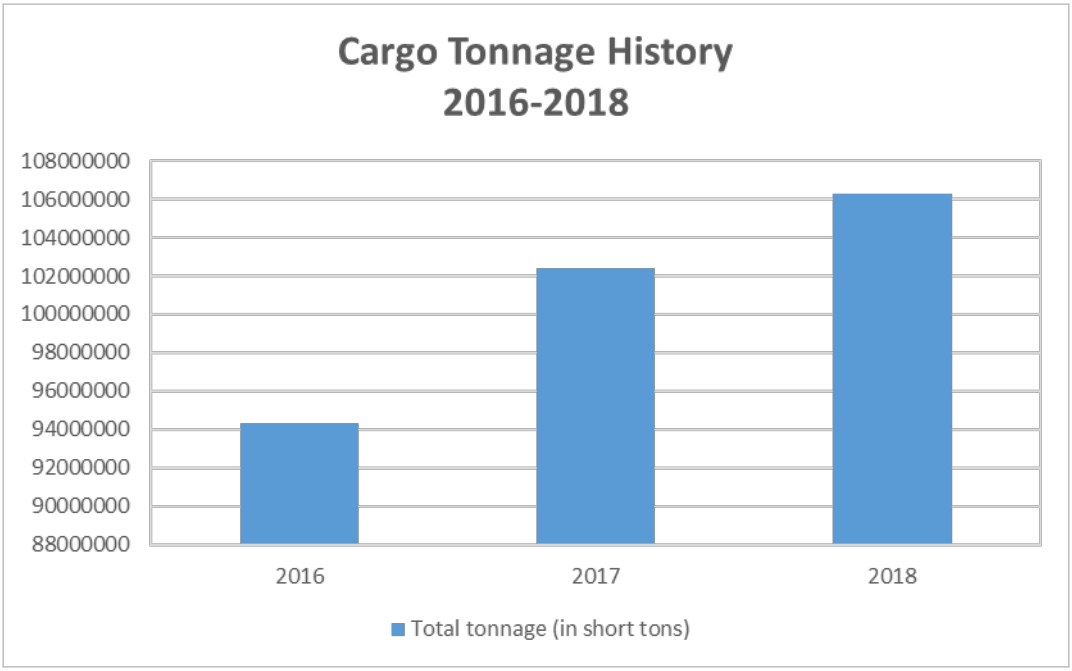
The graphic (right) shows a breakdown of the cargo transiting the Corpus Christi and La Quinta Ship Channels for 2018. Data provided by the Port of Corpus Christi Authority. (POCCA)

(LNG cargo, not shown in this graph, represents 8,121,853 sh. t. of product transferred from November 2018) LNG cargo data provided by Cheniere energy.



*Cargo Tonnage History*

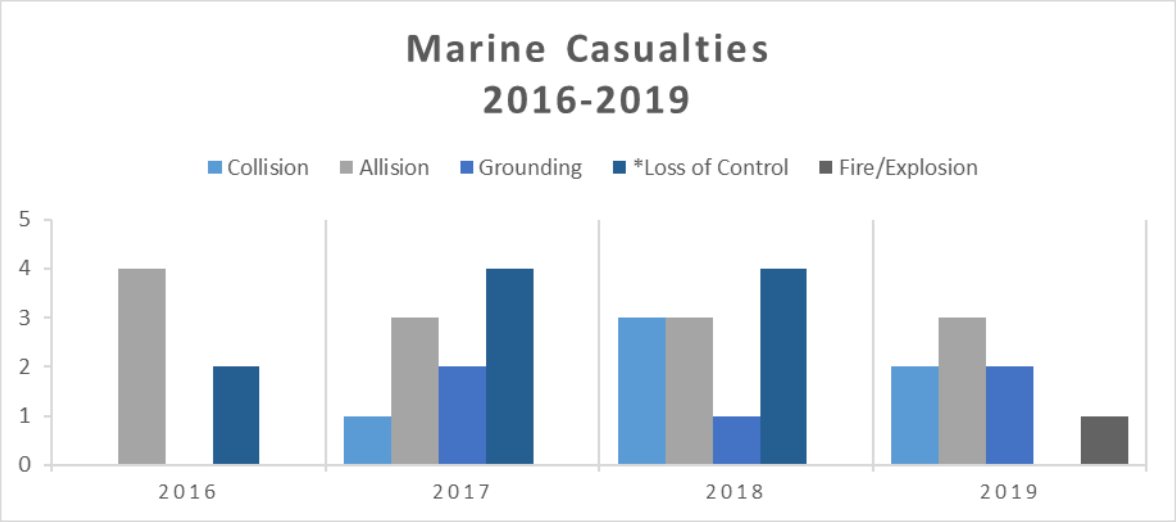
The following data was provided by the Port of Corpus Christi Authority. (POCCA)




* 2019 YTD cargo data unavailable

*Waterway Casualty History*

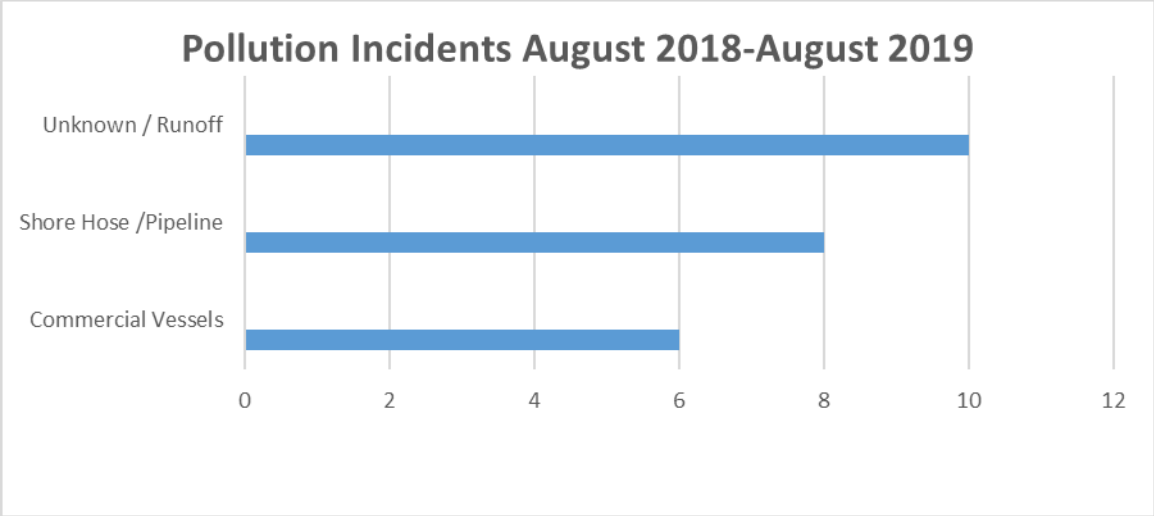
The following data was retrieved from the U.S. Coast Guard Marine Information for Safety and Law Enforcement (MISLE) database




*Loss of Vessel Control

*Pollution Spill History*

In an effort to provide participants with a comprehensive perspective of the waterway's pollution spill statistics, create a graphic representation in the form of a bar chart. Present the number of spills, between August 2018 and August 2019, by source:




VISIBILITY RESTRICTIONS

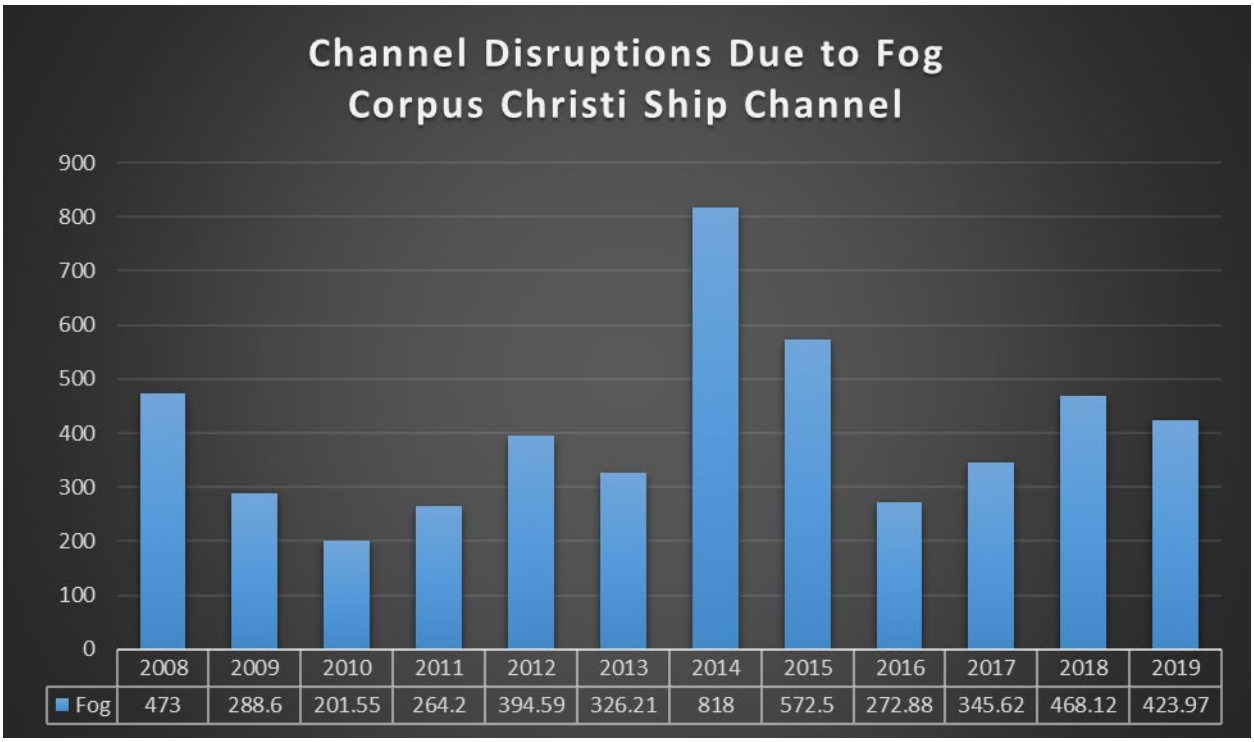



image A-1