VESSEL MONITORING SYSTEM (VMS) PINK SHRIMP BOTTOM TRAWL EFFORT DISTRIBUTION NORTH OF 40° 10' N. LAT., 2011-2013, AND 2009-2013

The Trawl RCA Final Environmental Assessment (EA)[1] associated with the rulemaking (79 FR 21639)[2, 3] that implemented recent changes to groundfish trawl RCA areas brought to light certain data gaps regarding distribution of pink shrimp bottom trawl gear effort within the trawl RCAs.

Taking into consideration data format and state confidentiality limitations regarding pink shrimp trawl logbooks (results, table 1, next page), coupled with potential discrepancies between logbook information and available observer data (figure 1, below), Vessel Monitoring System (VMS) data may be a useful data stream to better infer the actual footprint of the pink shrimp trawl fishery. The pink shrimp bottom trawl fishery has limited observer coverage; averaging between 4-14% coverage of fleet-wide effort in recent years.[4] Observer data suggests that the observed pink shrimp fishery footprint may be largely limited in depth to approximately 100 fathoms (figure 1).

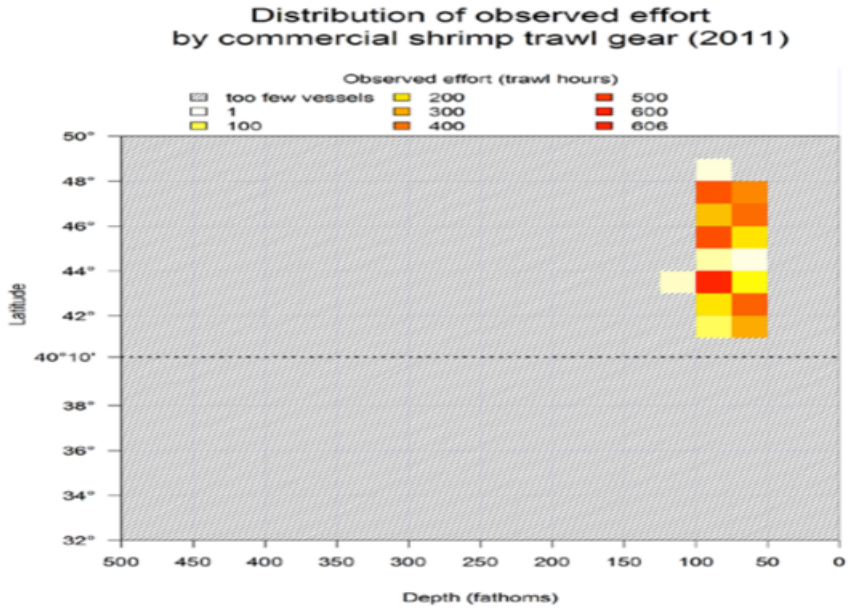

Figure 1 (Source: Final RCA EA, page 60, Figure 4-21): WCGOP distribution data of Pink Shrimp trawl observed trips from 2005-2011, by latitude, longitude, and effort hours under tow.

[1] http://www.westcoast.fisheries.noaa.gov/publications/nepa/groundfish/misc_ea/rca_ea_3_4_14.pdf
[2] http://www.westcoast.fisheries.noaa.gov/publications/frn/2014/79fr21639.pdf
[3] including http://www.westcoast.fisheries.noaa.gov/publications/frn/2014/79fr27196.pdf
[4] Source: Final RCA EA, page 61, table 4-11.

State	Year	max depth (fm)	hauls
Washington	2012	142	3,531
	2011	105	2,495
	2010	N/A	N/A
Oregon	2012	148	9,657
	2011	117	9,736
	2010	122	8,220
California	N/A	N/A	N/A

Table 1 (Source: Final RCA EA, page 58, table 4-10): History of pink shrimp trawl effort from state logbook records in max depth (fm) and total number of recorded hauls. CDFW has not been able to do much with their shrimp and prawn logs in recent years due to a lack of budget for data entry personnel (*Peter Kalvass, CDFW, Personal Communication*).

However, Washington and Oregon State commercial pink shrimp logbook data suggests that some level of effort is distributed deeper, between 100-150 fathoms, with virtually no effort deeper than 150 fathoms (see table 1, above). In an effort to further evaluate the spatial distribution of the pink shrimp bottom trawl fishery, NMFS West Coast Region prepared an analysis of VMS data to help inform future trawl RCA decisions.

VMS data has been used as a valuable enforcement tool for the NOAA Office of Law Enforcement (OLE) since the inception of the VMS program. However, little (or no) comprehensive analysis of VMS effort footprints for various gear types has been conducted on the West Coast to help inform environmental analysis products that contribute to fishery management decisions.

Before pink shrimp bottom trawl vessels are authorized to fish in the EEZ, they are required to file a VMS declaration report with the NOAA OLE declaring their intent to utilize pink shrimp trawl gear in the Exclusive Economic Zone (EEZ). The pink shrimp trawl fishery is allowed to fish within the groundfish bottom trawl RCAs. Utilization of pink shrimp trawl VMS declaration signals in this analysis product may help to document the fishery's true footprint.

This analysis utilized all West Coast declared pink shrimp trawl VMS signals within the OLE database between two time periods; between 2009-2013 (5 year effort) and 2011-2013 (3 year effort).

For context, figure 2 below depicts selected RCA intervals N. of 40° 10' N. lat.. The current groundfish bottom trawl RCA includes the area from 40° 10' N. lat. to 45° 46' N. lat., between 100 to 200 fathoms (modified with petrale cutouts), and the area from 45° 46' N. lat. to 48° 10'N. lat., 100 to 150 fathoms). Figures 3 and 4 then depict the pink shrimp bottom trawl VMS footprint from 2009-2011 (left) and 2011-2013 (right).

In addition to the pink shrimp VMS data layer, figures 3 and 4 show selected RCA areas, existing Essential Fish Habitat (EFH) closure areas, and proposed EFH closure areas submitted during phase 3 of the EFH review, so that the pink shrimp bottom trawl footprint generated from VMS data can be viewed in conjunction with other spatial management tools currently in place or under consideration.

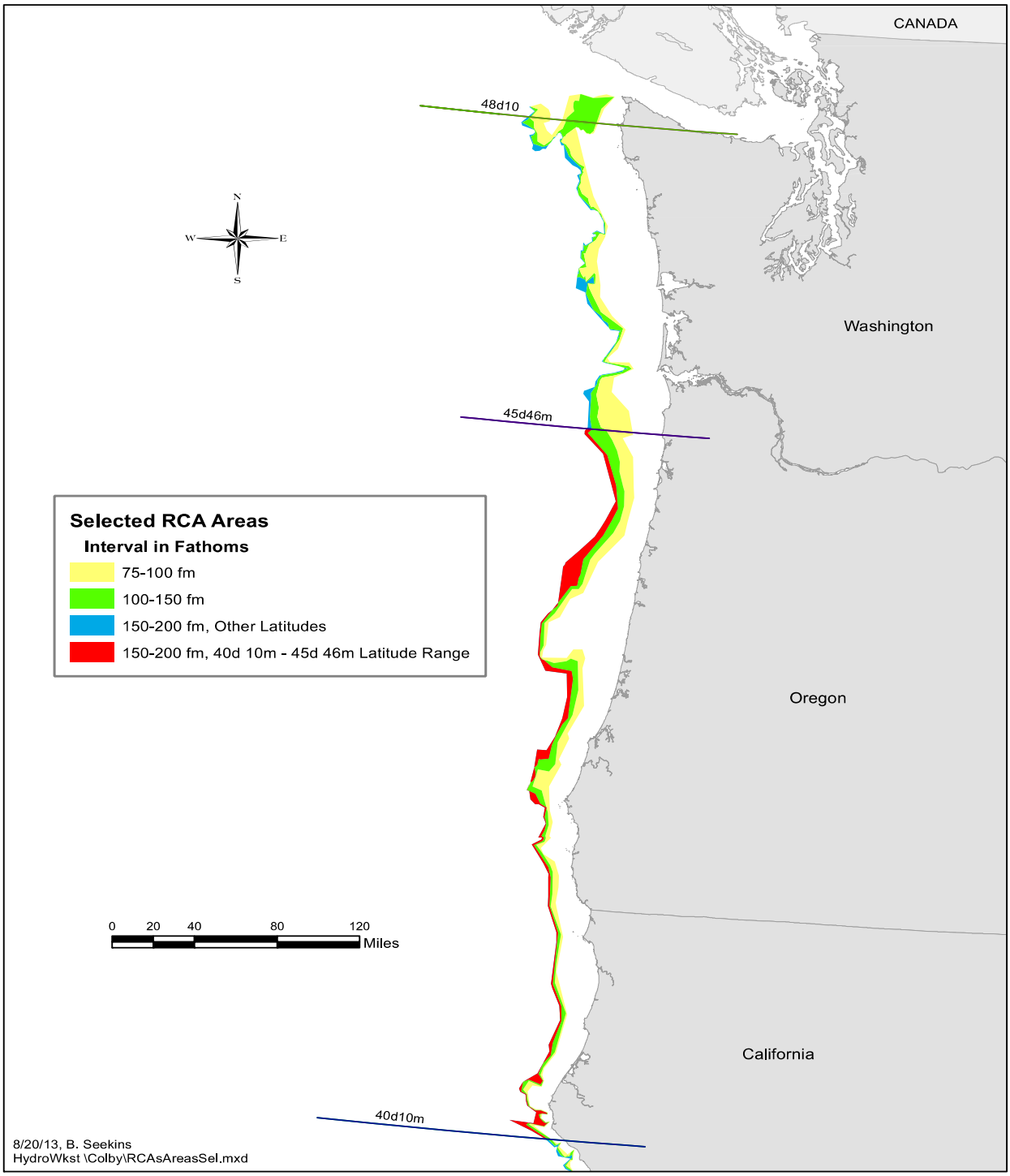

Figure 2: Selected RCA areas, interval by fm, emphasis added for 40° 10’ N. latitude, 45° 43’ N. latitude, and 48° 10’ N. latitude. Interval by fm is represented in yellow (75-100 fm), green (100-150 fm), blue (North of 45° 46’ N. lat. to 48° 10’ N. lat., 150-200 fm), and red (North of 40° 10’ N. lat. to 45° 46’ N. lat., 150-200 fm). Modified petrale cutouts are not displayed. Any discrepancies between the CSV coordinate files illustrated here and the coordinates published in the *Federal Register* will be resolved in favor of the *Federal Register*. NOTE: Yellow shoreward RCA (75-100 fm) are now open year-round to groundfish bottom trawl. Seaward (blue) depth area North of 45° 46’ N. lat. to 48° 10’ N. lat. is now open to groundfish bottom trawling year-round. **The seaward upper slope between 40° 10’ N. lat. to 45° 46’ N. lat. (red) and the shelf RCA area between 100 to 150 fm (green) remains closed to groundfish bottom trawling. Modified 200 fm line Petrale cutout areas (not displayed) are now open year-round.** Download this statement on the PFMC website PDF for color versions of this analysis.

Potential Data Limitations

- OLE has a process by which suspected accidental inaccurate declarations are addressed, which are handled on a case-by-case basis. Although VMS compliance is very strong amongst the majority of the fleet the majority of the time, some data contamination from other gear types may have occurred.

Assumptions in data treatment:

- A few pink shrimp VMS pings aggregations were located outside of the West Coast EEZ. These data points were in either isolation or in minor conglomerations. Areas that were excluded from the pink shrimp trawl VMS footprint were some VMS pings in discreet areas of Alaska, and some VMS pings approximately 50 miles offshore assumed to be albacore vessels. Therefore, VMS pings deeper than 300 fathoms were eliminated (within the West Coast EEZ), as the data points were assumed to be albacore effort activity. Both of these VMS data sources are assumed to be from vessels that may have forgotten to change their OLE VMS declarations prior to leaving the pink shrimp fishery.

- VMS patterns transiting through the Straight of Juan de Fuca were eliminated North of 48° 10' N. lat., as such patterns appeared to be obvious transiting.

- Only pink shrimp VMS pings between 6 a.m. to 10 p.m., during the pink shrimp trawl fishery season were utilized. Anecdotal information from industry suggested that pink shrimp trawl fishermen do not fish at night; therefore these pings were removed to reduce potential footprint contamination. For example, if not fishing, a vessel could be drifting in deeper depths at night while waiting for sunrise.

- Both pink shrimp VMS time series (2009-2011 & 2011-2013) demonstrate some VMS pings seaward of the groundfish trawl RCAs. However, anecdotal industry feedback, logbook data, and observer data all suggest that pink shrimp sets do not occur seaward of 150 fathoms. These deeper water upper slope pink shrimp VMS patters are assumed to be from vessels that may have forgotten to change their OLE VMS declarations prior to leaving the pink shrimp fishery, and entering the groundfish bottom trawl fishery. A primary reason for this assumption is the noticeable adherence to the seaward boundary of the groundfish trawl RCAs, even though these patterns were observed from pink shrimp VMS declarations. These seaward patterns are somewhat distinct from the more shoreward pink shrimp VMS footprint.

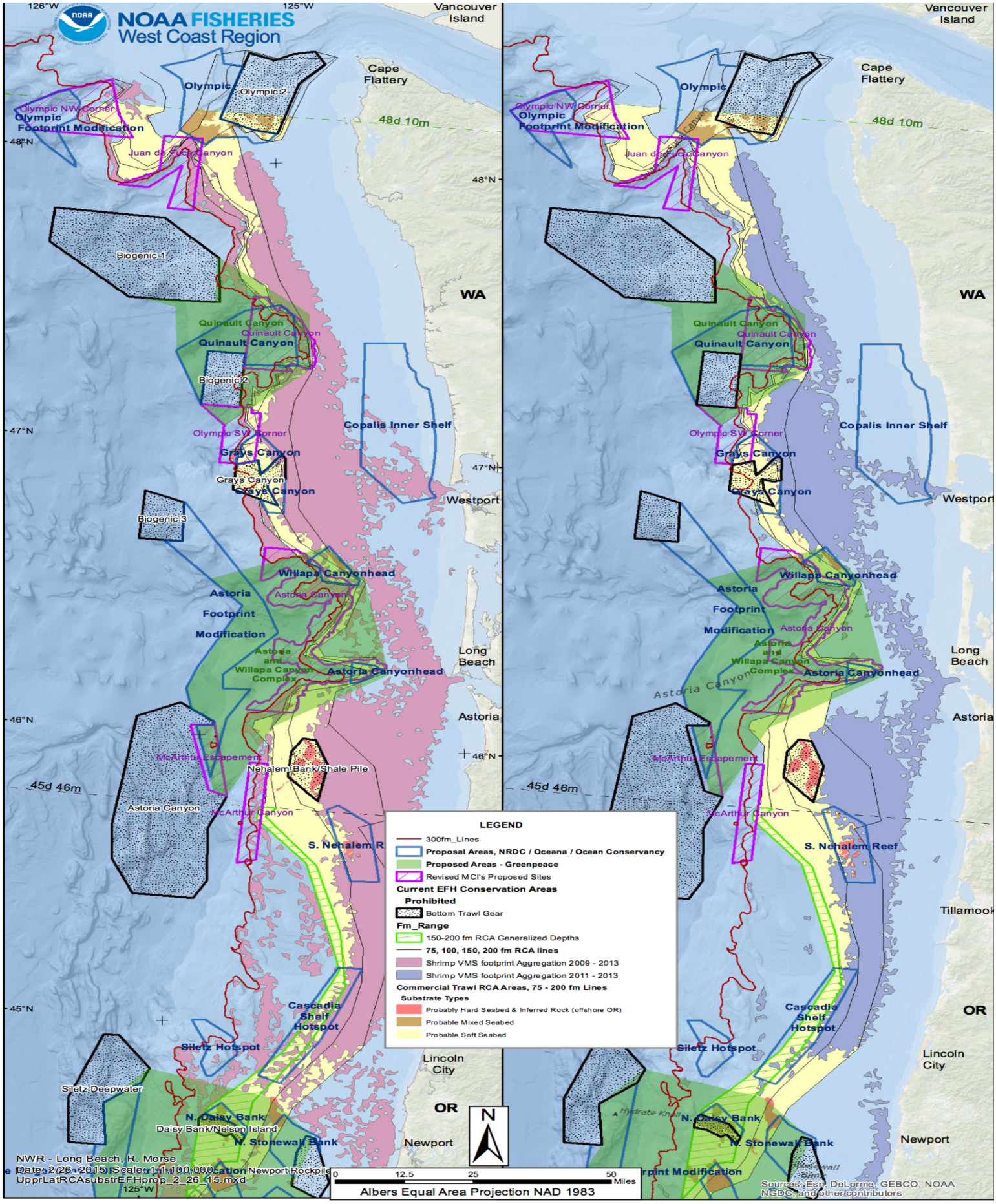

Figure 3: Selected RCA areas, existing EFH closure areas, proposed phase 3 EFH RFP areas, and pink shrimp trawl VMS footprint from 2009-2011 (in pink, left) and 2011-2013 (in blue, right).

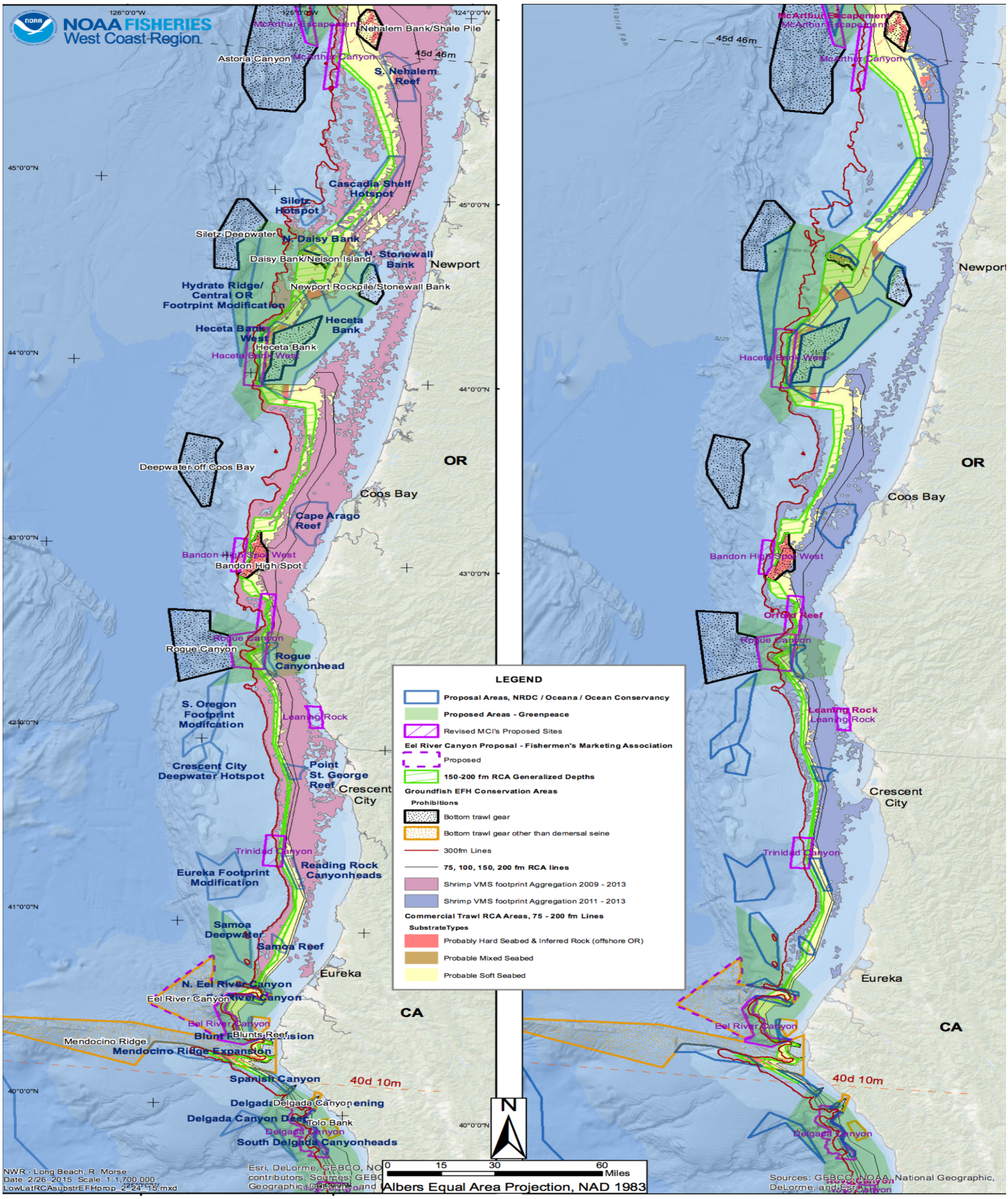

Figure 4: Selected RCA areas, existing EFH closure areas, proposed phase 3 EFH RFP areas, and pink shrimp trawl VMS footprint from 2009-2011 (in pink, left) and 2011-2013 (in blue, right).

Acknowledgements:

Pink shrimp data products and analysis were developed by Richard Morse, Barbara Seekins (retired), and Colby Brady. VMS GIS software analysis conducted by Richard Morse; Base GIS shape files including EFH RFP proposal areas (prior to inserting pink shrimp VMS layer footprints) were developed by Barbara Seekins; Colby Brady served as RCA subject matter expert; National Marine Fisheries Service, West Coast Region.

Acquisition of the VMS data for the above collaborators was made available by the generous assistance from NOAA's Office of Law Enforcement (Seattle and Washington D.C.). OLE staff key to the success of pink shrimp trawl VMS data acquisition are Kelly Spalding, Dennis Trager, Joe Albert, and Eliza Stevens. In addition, OLE staff provided review of figures 3 and 4 to insure that a robust data confidentiality protocol had been followed in developing these products.

Dr. Bob Hannah with The Oregon State Department of Fish and Wildlife was a valuable resource whom contributed to helping NMFS staff determine basic assumptions (i.e., season dates, effort patterns, etc.) about the pink shrimp trawl fishery in NMFS preparation of these data products. Dr. Hannah suggested NMFS not only look at 3-year footprint (i.e., recovery table), but investigate the 5-year footprint as well.

Preliminary review of VMS pink shrimp trawl maps and analysis methods was provided by the NMFS WCR EFH points-of-contact John Stadler and Steve Copps, as well as NMFS NWFSC EFH points-of-contact Curt Whitmire and Waldo Wakefield. Kerry Griffith, Council staff EFH point-of-contact, has provided valuable procedural guidance as well.

Obtain pink shrimp VMS GIS shape files (aggregated to protect confidentiality) for independent analysis:

Contact Colby Brady, NMFS, WCR, Colby.brady@noaa.gov, (206) 526-6117

Appendix 1

Pink Shrimp Management Aggregation Project

Data Processing steps to import raw data into GIS and to select only data points relevant to Pink Shrimp trawling during the months of April to October and the hours of 6:00 am to 10:00 pm.

Processes for utilizing Pink Shrimp Fishing Vessel Location data:
Fishing vessel location data covering the years 2009 – 2013 were provided in Excel spreadsheets with one month's worth of data on each spreadsheet. Each individual data point (record) represented a single ping from a vessel.

Files for the months representing fishing season, April – October, were included in the following steps, and those for November – March were omitted.

Each data record included the date, time, and location of the vessel (latitude and longitude coordinates reported in decimal degrees). All of these data elements for each ping came in a single data cell, with date, time, latitude, and longitude all included and separated by a space.

To separate these elements of each data point, a new spreadsheet was created with separate fields for date, time, latitude, and longitude. The data in each individual cell of the source file were separated into different cells by using splitting functions in Excel.

During this process, all records from the same month were combined into the same worksheets and all worksheets from the same year were combined into the same workbook. Because importing data one month at a time was too slow, and importing all files from a given year exceeded the processing capacity of the computer and ArcGIS, the seven months of each season were combined into two sets, one of 4 months and one of 3 months.

The ten data files – 2 for each year from 2009 to 2013 – were imported into ArcGIS, using the WSG 84 coordinate system, to create point layers. The two point layers from each year were then combined to create a single shape file for each year.

All data points collected from the hours of 10:00 pm to 6:00 am were removed from the data set because they represented data collected during non-fishing hours.

A map layer identifying the area of interest for pink shrimp management was then created. This map extended from the shorelines of Washington, Oregon, and Washington out to the 300 fathom depth contour, and from the US-Mexico border up to the US-Canada border. All points beyond this extent were removed from the data set. Additionally, points that extended up into bays and rivers along the coastline, which represented pings registered during vessel docking and transit time, were removed.

Determination of Point Density:

Tools used to generate point density:

Point Density Tool:
The Point Density Tool in ArcGIS's Spatial Analyst extension calculates a magnitude per unit area from the point feature s that fill within a neighborhood around each cell. This was used to generate a grid footprint - using cell size of 500 m and a rectangular neighborhood of 3 cells x 3 cells. These results were used to compare this approach against the results of other tools but were not found to be the most suited for the task.

Rule of Three Approach using Fishnet and Spatial Join Tools:
Vessel names were never provided with the data set, but despite this, one aggregation was run that abided by the "Rule of Three" to see the results. This calculated the number of pings of any vessel, regardless of identity, within a grid cell.

Fishnet tool (data management) creates a polygon layer in a square fishnet form as defined by the extent input and a defined cell size. Each polygon layer is composed of a grid of square polygons with the same height and width, and which extend in the x and y directions to fill the extent of the area of interest. Two fishnet polygon layers were created – one with polygon squares 500 sq. meters in size and the other with polygon squares 1000 sq. meters in size. The test using 500 sq. m cell size produced a footprint layer made up of some larger grid cell clusters with fragmented interiors and many dispersed individual cells around the perimeters of the main clusters. The 1000 sq. m test produced a footprint layer with grid cells that had merged together into fewer but larger and more consistent clusters with little fragmentation. Besides the tight clustering, the polygon squares size of 1000 sq m was also a good fit with the point density data layer run earlier, and was judged to be a good standard in footprint size and density for VMS point aggregation.

Spatial Join tool was used to combine vessel location points with the fishnet of polygon squares that overlaid them. The number of points that fell in each polygon square were summed and this value was attributed to the polygon square. Polygon squares with fewer than 3 points were not retained.

Aggregation:

Aggregate Points and Smoothing Tools – This approach was ultimately identified as the most ideal, partially due to the heavy demand on processing resources by other methods and partially due to the ease of use.
Aggregate Points Tool (cartography/generalization) was used to create a footprint directly from the points. It creates polygons around clusters of three or more points within the aggregation distance. The aggregate distance was chosen from the results of iterative tests which matched the point density footprint layer and the rule-of-three cell coverage tests samples the best. The best aggregation distance was found to be 1000 m – for both the three and five year aggregations.

Smoothing Tool: The polygons which result from the Aggregate Points Tool tend to have spiky corners where the footprints are strongly influenced by points at or beyond their edges.
To smooth the spiky corners on the edges of the aggregate polygons, a Smooth Polygon Tool was run. The smoothing algorithm used was PAEK, with a tolerance of 2000 m.

Thinning Step: After using the smoothing tool, there were still a large number of very small polygons that cluttered up the area. It was determined that the smallest of these polygons were mostly the result of very small clusters of points that were not part of larger aggregations and did not correlate with any clusters of rule-of-three grid squares. It was decided that all polygons with an area smaller than 2 sq. km should be deleted.

Additional polygons were determined to be related to vessel transit from harbors to fishing grounds and back, such as at the mouths of the Columbia River and Gray's Harbor, Washington, and Humboldt Bay, Oregon, but these polygons were not removed. Those using this data should keep this high traffic dynamic in mind when viewing polygons along shipping routes or at the mouth to busy harbors.

OUTLIER FILES

As points beyond the area of interest – between the shoreline and the 300 fathom contour from the US-Canada border to the US-Mexico border – were cut away from the overall data set, these points (outliers, inland points, deep sea points, points beyond the US Pacific Coast) were deposited in other files called "Excess.shp" in order to document them. Additional points from rivers and bays were removed and added to these excess files. The numbers of points from these bay and channel areas was extreme, since many port and transit areas were within these areas, and a great many pings were recorded when vessels idled while tied up at the pier, anchored, or during transit. Unfortunately the Excess.shp files were soon overwhelmed by the number of points and amount of data. Some of these outlier flies ultimately became corrupted due to their size, and lost their data. I don't see the necessity of recreating these files, which would contain 88% of the points provided at the start of this project and require a huge level of effort to recreate and to document.

Appendix 2

Shrimp VMS Footprint Aggregation 2011-2013

Shapefile

Tags

VMS, Shrimp, Pink Shrimp, Trawl, Vessel, Fishery, Pings, Aggregation, Footprint, Pacific, Groundfish

Summary

This data layer provides a graphical representation of the extent of vessel activity when declared by the vessel captain as participating in the pink shrimp trawl fishery, gear code declaration #41, considered with current essential fish habitat for groundfish within the US Pacific Coast EEZ as defined in the Pacific Coast Groundfish Management Plan, and as described in §§660.76 through 660.79 under current groundfish regulations. It is intended to facilitate visualization of these boundaries for the purpose of identifying and managing: (1) pink shrimp footprint impacts to benthic habitat derived from VMS data; (2) current EFH closure areas in that zone; (3) current EFH request for proposals (RFPs) being considered by the Pacific Fishery Management Council (PFMC) as potential new EFH closure areas within phase 3 of the current EFH 5-year review; (4) current RCA depth contour lines (75, 100, 150, 200, and 300 fathoms); and (5) groundfish bottom trawl effort as described in the Final Environmental Assessment (EA) for Bottom Trawl Rockfish Conservation Areas (RCA), completed 4/17/2014. It is not intended as a definitive identification of pink shrimp bottom trawl effort, but instead is intended to infer an improved spatial footprint utilizing VMS data than is currently available. The pink shrimp VMS data set largely resolves outstanding data-gaps and uncertainties of the spatial extent of pink shrimp trawl effort. For more information please refer to the associated metadata document.

Description

This data layer is an aggregation of points generated between 2011 and 2013 by locational beacons on shrimp fishing boats in US Pacific coast waters. The points used in the aggregation are a subset of a larger data set of fishing boat locations recorded at approximately 1 minute intervals by a Vessel Monitoring System (VMS). This subset represents only those points generated during fishing hours (6:00 am - 10:00 pm), during fishing season (April - October), and that fall within US Pacific coast waters between Mexico and Canada and from the outer coastline (bays and stream mouths omitted) out to the -300 fm. depth contour.

The polygons were generated using an aggregation distance of 1000 m, then smoothed using a BAEK smoothing algorithm with a tolerance of 2000 m. Resulting polygons with an area of 2 sq. km or less were deleted from the layer.

Credits

VMS NOAA Office of Law Enforcement (OLE)

Use limitations

There are no access and use limitations for this item.

Extent

977	550
)0	·4

Scale Range

n (zoomed in)	0
n (zoomed out)	)00

ArcGIS Metadata ►

Topics and Keywords ►

THEMES OR CATEGORIES OF THE RESOURCE oceans

* CONTENT TYPE Downloadable Data
EXPORT TO FGDC CSDGM XML FORMAT AS RESOURCE DESCRIPTION No

Hide Topics and Keywords ▲

Citation ►

* TITLE Shrimp VMS Footprint Aggregation 2011-2013
CREATION DATE 2015-03-01 00:00:00
PUBLICATION DATE 2015-03-20 00:00:00

PRESENTATION FORMATS * digital map
FGDC GEOSPATIAL PRESENTATION FORMAT vector digital data

Hide Citation ▲

Citation Contacts ►

RESPONSIBLE PARTY
INDIVIDUAL'S NAME Richard Morse
ORGANIZATION'S NAME NOAA / NMFS / West Coast Region, Long Beach, CA
CONTACT'S POSITION GIS Analyst
CONTACT'S ROLE originator

CONTACT INFORMATION ►
PHONE
VOICE (562) 983-1390

ADDRESS
TYPE both
DELIVERY POINT 501 W. Ocean Blvd. Suite 4200
CITY Long Beach
ADMINISTRATIVE AREA CA
POSTAL CODE 90802
E-MAIL ADDRESS richard.morse@noaa.gov

HOURS OF SERVICE
M-F, 8:30 - 4:30

Hide Contact information ▲

Hide Citation Contacts ▲

Resource Details ►

DATASET LANGUAGES * English (UNITED STATES)
DATASET CHARACTER SET utf8 - 8 bit UCS Transfer Format

STATUS completed
SPATIAL REPRESENTATION TYPE * vector

* PROCESSING ENVIRONMENT Microsoft Windows 7 Version 6.1 (Build 7601) Service Pack 1; Esri ArcGIS 10.2.0.3348

CREDITS
VMS NOAA Office of Law Enforcement (OLE)

ARCGIS ITEM PROPERTIES
* NAME Shrimp VMS Footprint Aggregation 2011-2013
* SIZE 0.722
* LOCATION file://\\SWRLB4GGM1R1\C$\Users\ram\Working\Small\PinkShrimp\Build Density Map\Shrimp VMS Footprint Aggregation 2011-2013.shp
* ACCESS PROTOCOL Local Area Network

Hide Resource Details ▲

Extents ►

EXTENT
DESCRIPTION
From the Strait of Juan de Fuca in the north to the city of Oceanside, California in the south, and from the Pacific coast seaward to the -300 fathom depth contour.

TEMPORAL EXTENT
BEGINNING DATE 2015-04-01 00:00:00
ENDING DATE 2015-10-31 00:00:00

EXTENT
GEOGRAPHIC EXTENT
BOUNDING RECTANGLE
EXTENT TYPE Extent used for searching
* WEST LONGITUDE -125.672977
* EAST LONGITUDE -116.806550
* NORTH LATITUDE 48.175800
* SOUTH LATITUDE 33.090464
* EXTENT CONTAINS THE RESOURCE Yes

EXTENT IN THE ITEM'S COORDINATE SYSTEM
* WEST LONGITUDE -430755.198618
* EAST LONGITUDE 242284.272219
* SOUTH LATITUDE -536522.635200
* NORTH LATITUDE 1122378.988759
* EXTENT CONTAINS THE RESOURCE Yes

Hide Extents ▲

Resource Points of Contact ►

POINT OF CONTACT
INDIVIDUAL'S NAME Richard Morse
ORGANIZATION'S NAME NOAA / NMFS / West Coast Region, Long Beach, CA
CONTACT'S POSITION GIS Analyst
CONTACT'S ROLE originator

CONTACT INFORMATION ►
PHONE
VOICE (562) 983-1390

ADDRESS
TYPE both
DELIVERY POINT 501 W. Ocean Blvd. Suite 4200
CITY Long Beach
ADMINISTRATIVE AREA CA
POSTAL CODE 90802
E-MAIL ADDRESS richard.morse@noaa.gov

HOURS OF SERVICE
M-F, 8:30 - 4:30

Hide Contact information ▲

Hide Resource Points of Contact ▲

Resource Maintenance ►

RESOURCE MAINTENANCE
UPDATE FREQUENCY unknown

Hide Resource Maintenance ▲

Spatial Reference ►

ARCGIS COORDINATE SYSTEM
* TYPE Projected
* GEOGRAPHIC COORDINATE REFERENCE GCS_North_American_1983
* PROJECTION NAD_1983_Albers
* COORDINATE REFERENCE DETAILS
PROJECTED COORDINATE SYSTEM
X ORIGIN -16909700
Y ORIGIN -8597000
XY SCALE 266332319.7555542
Z ORIGIN -100000
Z SCALE 10000
M ORIGIN -100000
M SCALE 10000
XY TOLERANCE 0.001
Z TOLERANCE 0.001
M TOLERANCE 0.001
HIGH PRECISION true
WELL-KNOWN TEXT
PROJCS["NAD_1983_Albers",GEOGCS["GCS_North_American_1983",DATUM["D_North_American_1983"
,SPHEROID["GRS_1980",6378137.0,298.257222101]],PRIMEM["Greenwich",0.0],UNIT["Degree",0.0174
532925199433]],PROJECTION["Albers"],PARAMETER["False_Easting",0.0],PARAMETER["False_Northing"
,-4000000.0],PARAMETER["Central_Meridian",-
120.0],PARAMETER["Standard_Parallel_1",34.0],PARAMETER["Standard_Parallel_2",40.5],PARAMETER["
Latitude_Of_Origin",0.0],UNIT["Meter",1.0]]

REFERENCE SYSTEM IDENTIFIER
* VALUE 0

Hide Spatial Reference ▲

Spatial Data Properties ►

VECTOR ►
* LEVEL OF TOPOLOGY FOR THIS DATASET geometry only

GEOMETRIC OBJECTS
FEATURE CLASS NAME Shrimp VMS Footprint Aggregation 2011-2013
* OBJECT TYPE composite
* OBJECT COUNT 149

Hide Vector ▲

ARCGIS FEATURE CLASS PROPERTIES ►
FEATURE CLASS NAME Shrimp VMS Footprint Aggregation 2011-2013
* FEATURE TYPE Simple
* GEOMETRY TYPE Polygon
* HAS TOPOLOGY FALSE
* FEATURE COUNT 149
* SPATIAL INDEX FALSE
* LINEAR REFERENCING FALSE

Hide ArcGIS Feature Class Properties ▲

Hide Spatial Data Properties ▲

Data Quality ►

DATA QUALITY REPORT - CONCEPTUAL CONSISTENCY ►
DIMENSION horizontal

MEASURE DESCRIPTION
These data were reviewed visually against the contours, shorelines, and EEZ boundaries used to create them and are believed to be logically consistent although no tests were performed.

EVALUATION METHOD
Indirect

Hide Data quality report - Conceptual consistency ▲

DATA QUALITY REPORT - COMPLETENESS OMISSION ►
MEASURE DESCRIPTION
Some polygons were determined to be related to vessel transit from harbors to fishing grounds and back, such as at the mouths of the Columbia River and Grays Harbor, Washington, and Humboldt Bay, Oregon, but these polygons were not removed. Those using this data should keep this high traffic dynamic in mind when viewing polygons along shipping routes or at the mouth to busy harbors.

EVALUATION TYPE direct external

EVALUATION METHOD
Pattern recognition of points leading to and from, and clustered around the entrance to, ports, harbors, and river mouths.

Hide Data quality report - Completeness omission ▲

Hide Data Quality ▲

Lineage ►

LINEAGE STATEMENT
VMS data points of shrimp trawling vessel locations, covering the correct time of day, season, and years were input into ArcGIS and then aggregated into footprints representing the point clouds.

PROCESS STEP ►
WHEN THE PROCESS OCCURRED 2014-10-02 00:00:00
DESCRIPTION
Data records recorded during the months of November through March were deleted from the data set
Data records recorded during the hours of 10:00 pm and 6:00 am were deleted from the data set
Data records for the years 2009 and 2010 were deleted from the data set

RATIONALE
Data points of interest include only those points recorded during the fishing season of April - October and during the hours of 6:00 am and 10:00 pm for the years 2011 through 2013.

Hide Process step ▲

PROCESS STEP ►
WHEN THE PROCESS OCCURRED 2014-10-17 00:00:00
DESCRIPTION
A study area polygon, extending from the US Pacific Coast of Washington, Oregon, and California out to the -300 fathom depth contour and from the Exclusive Economic Zone (EEZ) border with Canada to the EEZ border with Mexico, was used to select then save all points that fell within the study area.

RATIONALE
The project is only interested in US Waters out to the -300 fathom depth contour because these are the waters in which pink shrimp trawling activity was expected to be found based on Log Books and anecdotal industry input.

Hide Process step ▲

PROCESS STEP ►
WHEN THE PROCESS OCCURRED 2014-11-11 00:00:00
DESCRIPTION
Data points in waters seaward of the coastline that were not part of the open ocean, such as bays, harbors, and mouths to rivers and streams, were deleted from the data set.

RATIONALE
Points within bays, harbors, and in the mouths of tributaries were determined to be related to vessel time spent at anchor, in port, and in transit from harbors to fishing grounds and back,

Hide Process step ▲

PROCESS STEP ►
WHEN THE PROCESS OCCURRED 2015-01-16 00:00:00
DESCRIPTION
Thinning Step: A field called "Area_sq_km" was inserted into the smoothed aggregation layer and the area in square kilometers was calculated. All polygons measuring less than 2 square kilometers were deleted from the layer.

RATIONALE
After using the smoothing tool, there were still a large number of very small polygons that cluttered up the area. It was determined that the smallest of these polygons were mostly the result of very small clusters of few points that were not part of larger aggregations and did not correlate with any clusters of rule-of-three grid squares tested earlier. It was decided that all polygons with an area smaller than 2 sq. km should be deleted.

Hide Process step ▲

PROCESS STEP ►
WHEN THE PROCESS OCCURRED 2015-01-15 00:00:00
DESCRIPTION
A smoothing tool was used to remove the rough edges of the polygons generated by the aggregate points tool. The smoothing algorithm used was PAEK, with a tolerance of 2000 m.

RATIONALE
The polygons which result from the Aggregate Points Tool tend to have spiky corners where the footprints are strongly influenced by points at or beyond their edges. It was decided to use a smoothing tool to reduce the eccentricities of these spiky corners. The PAEK smoothing algorithm with a tolerance of 2000 m produced results that were the most consistent.

Hide Process step ▲

PROCESS STEP ►
WHEN THE PROCESS OCCURRED 2015-01-14 00:00:00
DESCRIPTION
All remaining points, representing VMS locations for fishing hours and seasons for the years 2009 to 2013, were used to generate an aggregate footprint. This was done using the ArcGIS Aggregation Point Tool, using an aggregation distance of 1000 m.

RATIONALE

Earlier attempts to aggregate the points included using the ArcGIS point density tool, and using spatial join to combine grid squares to the points, which were then treated under a rule-of-three approach. The rule-of-three cell size of 1000 m produced coverage that closed most internal gaps and reduced fragmentation of cell clusters but did not combine larger, separate point clusters. The results of these approaches were compared to various iterations run with the aggregation point tool, which led to selection of the aggregation tool with an aggregation size of 1000 m as the best and most efficient approach for the process. This aggregation size produced the most consistent looking polygons at the scale of 1:1.1 million, at which scale the final map product was produced.

Hide Process step ▲

SOURCE DATA ►
DESCRIPTION
VMS NOAA Office of Law Enforcement (OLE) provided by Kelly Spalding and Dennis Trager. Geographic extent of vessel activity when declared by the vessel captain as participating in the pink shrimp trawl fishery, gear code declaration #41. Current Essential Fish Habitat (EFH) closure areas from the Pacific Coast Groundfish Fishery Management Plan. Data collection covered the period, Jan 1, 2009 to Dec. 31, 2013.

SOURCE MEDIUM NAME online link
Hide Source data ▲

Hide Lineage ▲

Geoprocessing history ►

PROCESS
PROCESS NAME
DATE 2015-01-15 14:07:46
TOOL LOCATION c:\program files\arcgis\desktop10.2\ArcToolbox\Toolboxes\Data Management Tools.tbx\CalculateField
COMMAND ISSUED
```
CalculateField "EFH Proposals 2014 Group Layer\MCI\FMA\Agg1000Comb2011_13_smooth" Id 1 VB #
```
INCLUDE IN LINEAGE WHEN EXPORTING METADATA No

PROCESS
PROCESS NAME
DATE 2015-01-15 14:08:44
TOOL LOCATION c:\program files\arcgis\desktop10.2\ArcToolbox\Toolboxes\Data Management Tools.tbx\CalculateField
COMMAND ISSUED
```
CalculateField "EFH Proposals 2014 Group Layer\MCI\FMA\Agg1000Comb2011_13_smooth" Id 2 VB #
```
INCLUDE IN LINEAGE WHEN EXPORTING METADATA No

PROCESS
PROCESS NAME
DATE 2015-01-15 14:09:23
TOOL LOCATION c:\program files\arcgis\desktop10.2\ArcToolbox\Toolboxes\Data Management Tools.tbx\CalculateField

COMMAND ISSUED
CalculateField "EFH Proposals 2014 Group Layer\MCI\FMA\Agg1000Comb2011_13_smooth" Id 3 VB #

INCLUDE IN LINEAGE WHEN EXPORTING METADATA No

PROCESS
PROCESS NAME
DATE 2015-01-15 14:09:58
TOOL LOCATION c:\program files\arcgis\desktop10.2\ArcToolbox\Toolboxes\Data Management Tools.tbx\CalculateField
COMMAND ISSUED
CalculateField "EFH Proposals 2014 Group Layer\MCI\FMA\Agg1000Comb2011_13_smooth" Id 4 VB #

INCLUDE IN LINEAGE WHEN EXPORTING METADATA No

PROCESS
PROCESS NAME
DATE 2015-01-15 14:11:13
TOOL LOCATION c:\program files\arcgis\desktop10.2\ArcToolbox\Toolboxes\Data Management Tools.tbx\CalculateField
COMMAND ISSUED
CalculateField "EFH Proposals 2014 Group Layer\MCI\FMA\Agg1000Comb2011_13_smooth" Id 5 VB #

INCLUDE IN LINEAGE WHEN EXPORTING METADATA No

PROCESS
PROCESS NAME
DATE 2015-01-15 14:13:28
TOOL LOCATION c:\program files\arcgis\desktop10.2\ArcToolbox\Toolboxes\Data Management Tools.tbx\CalculateField
COMMAND ISSUED
CalculateField "EFH Proposals 2014 Group Layer\MCI\FMA\Agg1000Comb2011_13_smooth" Id 6 VB #

INCLUDE IN LINEAGE WHEN EXPORTING METADATA No

PROCESS
PROCESS NAME
DATE 2015-01-15 14:13:56
TOOL LOCATION c:\program files\arcgis\desktop10.2\ArcToolbox\Toolboxes\Data Management Tools.tbx\CalculateField
COMMAND ISSUED
CalculateField "EFH Proposals 2014 Group Layer\MCI\FMA\Agg1000Comb2011_13_smooth" Id 7 VB #

INCLUDE IN LINEAGE WHEN EXPORTING METADATA No

PROCESS
PROCESS NAME
DATE 2015-01-15 14:14:20
TOOL LOCATION c:\program files\arcgis\desktop10.2\ArcToolbox\Toolboxes\Data Management Tools.tbx\CalculateField
COMMAND ISSUED
CalculateField "EFH Proposals 2014 Group Layer\MCI\FMA\Agg1000Comb2011_13_smooth" Id 8 VB #

INCLUDE IN LINEAGE WHEN EXPORTING METADATA No

PROCESS
PROCESS NAME
DATE 2015-01-15 14:15:05
TOOL LOCATION c:\program files\arcgis\desktop10.2\ArcToolbox\Toolboxes\Data Management Tools.tbx\CalculateField

COMMAND ISSUED
CalculateField "EFH Proposals 2014 Group Layer\MCI\FMA\Agg1000Comb2011_13_smooth" Id 9 VB #

INCLUDE IN LINEAGE WHEN EXPORTING METADATA No

PROCESS
PROCESS NAME
DATE 2015-01-15 14:15:31
TOOL LOCATION c:\program files\arcgis\desktop10.2\ArcToolbox\Toolboxes\Data Management Tools.tbx\CalculateField
COMMAND ISSUED
CalculateField "EFH Proposals 2014 Group Layer\MCI\FMA\Agg1000Comb2011_13_smooth" Id 10 VB #

INCLUDE IN LINEAGE WHEN EXPORTING METADATA No

PROCESS
PROCESS NAME
DATE 2015-01-15 14:17:10
TOOL LOCATION c:\program files\arcgis\desktop10.2\ArcToolbox\Toolboxes\Data Management Tools.tbx\CalculateField
COMMAND ISSUED
CalculateField "EFH Proposals 2014 Group Layer\MCI\FMA\Agg1000Comb2011_13_smooth" Id 11 VB #

INCLUDE IN LINEAGE WHEN EXPORTING METADATA No

PROCESS
PROCESS NAME
DATE 2015-01-15 14:17:23
TOOL LOCATION c:\program files\arcgis\desktop10.2\ArcToolbox\Toolboxes\Data Management Tools.tbx\CalculateField
COMMAND ISSUED
CalculateField "EFH Proposals 2014 Group Layer\MCI\FMA\Agg1000Comb2011_13_smooth" Id 11 VB #

INCLUDE IN LINEAGE WHEN EXPORTING METADATA No

Hide Geoprocessing history ▲

Distribution ►

DISTRIBUTION FORMAT
VERSION ArcGIS 10.2
* NAME Shapefile

TRANSFER OPTIONS
* TRANSFER SIZE 0.722

Hide Distribution ▲

Fields ►

DETAILS FOR OBJECT Shrimp VMS Footprint Aggregation 2011-2013 ►
* TYPE Feature Class
* ROW COUNT 149
DEFINITION
Title

DEFINITION SOURCE

NOAA/NMFS/WCR/SFD - Seattle

FIELD FID ►
* ALIAS FID
* DATA TYPE OID
* WIDTH 4
* PRECISION 0
* SCALE 0
* FIELD DESCRIPTION
Internal feature number.

* DESCRIPTION SOURCE
Esri

* DESCRIPTION OF VALUES
Sequential unique whole numbers that are automatically generated.

Hide Field FID ▲

FIELD Shape ►
* ALIAS Shape
* DATA TYPE Geometry
* WIDTH 0
* PRECISION 0
* SCALE 0
* FIELD DESCRIPTION
Feature geometry.

* DESCRIPTION SOURCE
Esri

* DESCRIPTION OF VALUES
Coordinates defining the features.

Hide Field Shape ▲

FIELD Id ►
* ALIAS Id
* DATA TYPE Integer
* WIDTH 6
* PRECISION 6
* SCALE 0
FIELD DESCRIPTION
Polygon Size Classification

DESCRIPTION SOURCE
NOAA Fisheries, WCR, Long Beach

LIST OF VALUES
VALUE 3
DESCRIPTION polygons between 2 and 3 square kilometers in size
ENUMERATED DOMAIN VALUE DEFINITION SOURCE NOAA/NMFS/WCR, Long Beach

VALUE 4
DESCRIPTION polygons between 3 and 4 square kilometers in size
ENUMERATED DOMAIN VALUE DEFINITION SOURCE NOAA/NMFS/WCR, Long Beach

VALUE 5
DESCRIPTION polygons between 4 and 5 square kilometers in size
ENUMERATED DOMAIN VALUE DEFINITION SOURCE NOAA/NMFS/WCR, Long Beach

VALUE 6
DESCRIPTION polygons between 5 and 6 square kilometers in size
ENUMERATED DOMAIN VALUE DEFINITION SOURCE NOAA/NMFS/WCR, Long Beach

VALUE 7
DESCRIPTION polygons between 6 and 7 square kilometers in size
ENUMERATED DOMAIN VALUE DEFINITION SOURCE NOAA/NMFS/WCR, Long Beach

VALUE 8
DESCRIPTION polygons between 7 and 8 square kilometers in size
ENUMERATED DOMAIN VALUE DEFINITION SOURCE NOAA/NMFS/WCR, Long Beach

VALUE 9
DESCRIPTION polygons between 8 and 9 square kilometers in size
ENUMERATED DOMAIN VALUE DEFINITION SOURCE NOAA/NMFS/WCR, Long Beach

VALUE 10
DESCRIPTION polygons between 9 and 10 square kilometers in size
ENUMERATED DOMAIN VALUE DEFINITION SOURCE NOAA/NMFS/WCR, Long Beach

VALUE 11
DESCRIPTION polygons larger than 10 square kilometers in size
ENUMERATED DOMAIN VALUE DEFINITION SOURCE NOAA/NMFS/WCR, Long Beach

ACCURACY INFORMATION
ACCURACY Polygon classified by number of square kilometers
MEASUREMENT FREQUENCY not planned

Hide Field Id ▲

FIELD Area_sq_km ►
* ALIAS Area_sq_km
* DATA TYPE Double
* WIDTH 11
* PRECISION 10
* SCALE 3
FIELD DESCRIPTION
Area of polygon in square kilometers

DESCRIPTION SOURCE
Generated within ArcGIS

ACCURACY INFORMATION
ACCURACY Area of polygon in square kilometers
MEASUREMENT FREQUENCY not planned

Hide Field Area_sq_km ▲

Hide Details for object Shrimp VMS Footprint Aggregation 2011-2013 ▲

Hide Fields ▲

Metadata Details ►

* METADATA LANGUAGE English (UNITED STATES)
METADATA CHARACTER SET utf8 - 8 bit UCS Transfer Format

SCOPE OF THE DATA DESCRIBED BY THE METADATA * dataset
SCOPE NAME * dataset

* LAST UPDATE 2015-03-05

ARCGIS METADATA PROPERTIES
METADATA FORMAT ArcGIS 1.0
METADATA STYLE FGDC CSDGM Metadata
STANDARD OR PROFILE USED TO EDIT METADATA FGDC

CREATED IN ARCGIS FOR THE ITEM 2015-01-15 11:12:14
LAST MODIFIED IN ARCGIS FOR THE ITEM 2015-03-05 11:54:09

AUTOMATIC UPDATES
HAVE BEEN PERFORMED Yes
LAST UPDATE 2015-03-05 11:54:09

Hide Metadata Details ▲

Metadata Contacts ►

METADATA CONTACT
INDIVIDUAL'S NAME Richard Morse
ORGANIZATION'S NAME NOAA / NMFS / West Coast Region, Long Beach, CA
CONTACT'S POSITION GIS Analyst
CONTACT'S ROLE originator

CONTACT INFORMATION ►
PHONE
VOICE (562) 983-1390

ADDRESS
TYPE both
DELIVERY POINT 501 W. Ocean Blvd. Suite 4200
CITY Long Beach
ADMINISTRATIVE AREA CA
POSTAL CODE 90802
E-MAIL ADDRESS richard.morse@noaa.gov

HOURS OF SERVICE
M-F, 8:30 - 4:30

Hide Contact information ▲

Hide Metadata Contacts ▲

Metadata Maintenance ►

MAINTENANCE
UPDATE FREQUENCY unknown

Hide Metadata Maintenance ▲

Metadata Constraints ►

CONSTRAINTS
LIMITATIONS OF USE
This data layers is not intended as a definitive identification of pink shrimp bottom trawl effort, but instead is intended to infer an improved spatial footprint utilizing VMS data than is currently available. The pink shrimp VMS data set largely resolves outstanding data-gaps and uncertainties of the spatial extent of pink shrimp trawl effort. For more information please refer to the associated metadata document.

Hide Metadata Constraints ▲

FGDC Metadata (read-only) ▼

DETAILED DESCRIPTION
ENTITY TYPE
ENTITY TYPE LABEL Shrimp VMS Footprint Aggregation 2011-2013
ENTITY TYPE DEFINITION
Title
ENTITY TYPE DEFINITION SOURCE NOAA/NMFS/WCR/SFD - Seattle

ATTRIBUTE
ATTRIBUTE LABEL FID
ATTRIBUTE DEFINITION
Internal feature number.
ATTRIBUTE DEFINITION SOURCE Esri
ATTRIBUTE DOMAIN VALUES
UNREPRESENTABLE DOMAIN
Sequential unique whole numbers that are automatically generated.

ATTRIBUTE
ATTRIBUTE LABEL Shape
ATTRIBUTE DEFINITION
Feature geometry.
ATTRIBUTE DEFINITION SOURCE Esri
ATTRIBUTE DOMAIN VALUES
UNREPRESENTABLE DOMAIN
Coordinates defining the features.

ATTRIBUTE
ATTRIBUTE LABEL Id

ATTRIBUTE DEFINITION
Polygon Size Classification
ATTRIBUTE DEFINITION SOURCE NOAA Fisheries, WCR, Long Beach
ATTRIBUTE DOMAIN VALUES
ENUMERATED DOMAIN
ENUMERATED DOMAIN VALUE 3
ENUMERATED DOMAIN VALUE DEFINITION
polygons between 2 and 3 square kilometers in size
ENUMERATED DOMAIN VALUE DEFINITION SOURCE
NOAA/NMFS/WCR, Long Beach
ENUMERATED DOMAIN
ENUMERATED DOMAIN VALUE 4
ENUMERATED DOMAIN VALUE DEFINITION
polygons between 3 and 4 square kilometers in size
ENUMERATED DOMAIN VALUE DEFINITION SOURCE
NOAA/NMFS/WCR, Long Beach
ENUMERATED DOMAIN
ENUMERATED DOMAIN VALUE 5
ENUMERATED DOMAIN VALUE DEFINITION
polygons between 4 and 5 square kilometers in size
ENUMERATED DOMAIN VALUE DEFINITION SOURCE
NOAA/NMFS/WCR, Long Beach
ENUMERATED DOMAIN
ENUMERATED DOMAIN VALUE 6
ENUMERATED DOMAIN VALUE DEFINITION
polygons between 5 and 6 square kilometers in size
ENUMERATED DOMAIN VALUE DEFINITION SOURCE
NOAA/NMFS/WCR, Long Beach
ENUMERATED DOMAIN
ENUMERATED DOMAIN VALUE 7
ENUMERATED DOMAIN VALUE DEFINITION
polygons between 6 and 7 square kilometers in size
ENUMERATED DOMAIN VALUE DEFINITION SOURCE
NOAA/NMFS/WCR, Long Beach
ENUMERATED DOMAIN
ENUMERATED DOMAIN VALUE 8
ENUMERATED DOMAIN VALUE DEFINITION
polygons between 7 and 8 square kilometers in size
ENUMERATED DOMAIN VALUE DEFINITION SOURCE
NOAA/NMFS/WCR, Long Beach
ENUMERATED DOMAIN
ENUMERATED DOMAIN VALUE 9
ENUMERATED DOMAIN VALUE DEFINITION
polygons between 8 and 9 square kilometers in size
ENUMERATED DOMAIN VALUE DEFINITION SOURCE
NOAA/NMFS/WCR, Long Beach
ENUMERATED DOMAIN
ENUMERATED DOMAIN VALUE 10
ENUMERATED DOMAIN VALUE DEFINITION
polygons between 9 and 10 square kilometers in size
ENUMERATED DOMAIN VALUE DEFINITION SOURCE
NOAA/NMFS/WCR, Long Beach
ENUMERATED DOMAIN
ENUMERATED DOMAIN VALUE 11
ENUMERATED DOMAIN VALUE DEFINITION
polygons larger than 10 square kilometers in size
ENUMERATED DOMAIN VALUE DEFINITION SOURCE
NOAA/NMFS/WCR, Long Beach
ATTRIBUTE VALUE ACCURACY INFORMATION
ATTRIBUTE VALUE ACCURACY Polygon classified by number of square kilometers
ATTRIBUTE MEASUREMENT FREQUENCY

011

ATTRIBUTE
ATTRIBUTE LABEL Area_sq_km
ATTRIBUTE DEFINITION
Area of polygon in square kilometers
ATTRIBUTE DEFINITION SOURCE Generated within ArcGIS
ATTRIBUTE VALUE ACCURACY INFORMATION
ATTRIBUTE VALUE ACCURACY Area of polygon in square kilometers
ATTRIBUTE MEASUREMENT FREQUENCY
011

Hide Entities and Attributes ▲

Appendix 3

Shrimp VMS Footprint Aggregation 2009-2013

Shapefile

Thumbnail Not Available

Tags

VMS, Shrimp, Pink Shrimp, Trawl, Vessel, Fishery, Pings, Aggregation, Footprint, Pacific, Groundfish

Summary

This data layer provides a graphical representation of the extent of vessel activity when declared by the vessel captain as participating in the pink shrimp trawl fishery, gear code declaration #41, considered with current essential fish habitat for groundfish within the US Pacific coast Coast EEZ as defined in the Pacific Coast Groundfish Management Plan, and as described in §§660.76 through 660.79 under current groundfish regulations. It is intended to facilitate visualization of these boundaries for the purpose of identifying and managing: (1) pink shrimp footprint impacts to benthic habitat derived from VMS data; (2) current EFH closure areas in that zone; (3) current EFH request for proposals (RFPs) being considered by the Pacific Fishery Management Council (PFMC) as potential new EFH closure areas within phase 3 of the current EFH 5-year review; (4) current RCA depth contour lines (75, 100, 150, 200, and 300 fathoms); and (5) groundfish bottom trawl effort as described in the Final Environmental Assessment (EA) for Bottom Trawl Rockfish Conservation Areas (RCA), completed 4/17/2014. It is not intended as a definitive identification of pink shrimp bottom trawl effort, but instead is intended to infer an improved spatial footprint utilizing VMS data than is currently available. The pink shrimp VMS data set largely resolves outstanding data-gaps and uncertainties of the spatial extent of pink shrimp trawl effort. For more information please refer to the associated metadata document.

Description

This data layer is an aggregation of points generated between 2009 and 2013 by locational beacons on shrimp fishing boats in US Pacific coast waters. The points used in the aggregation are a subset of a larger data set of fishing boat locations recorded at approximately 1 minute intervals by a Vessel Monitoring System (VMS). This subset represents only those points generated during fishing hours (6:00 am - 10:00 pm), during fishing season (April - October), and that fall within US Pacific coast waters between Mexico and Canada and from the outer coastline (bays and stream mouths omitted) out to the -300 fm depth contour.

The polygons were generated using an aggregation distance of 1000 m, then smoothed using a Baek smoothing algorithm with a tolerance of 2000 m. Resulting polygons with an area of 2 sq. km or less were deleted from the layer.

Credits

VMS NOAA Office of Law Enforcement (OLE)

Use limitations

There are no access and use limitations for this item.

Extent

294 408

·0 '1

Scale Range

n (zoomed in)

n (zoomed out) 000

ArcGIS Metadata ►

Topics and Keywords ►

* CONTENT TYPE Downloadable Data
EXPORT TO FGDC CSDGM XML FORMAT AS RESOURCE DESCRIPTION No

Hide Topics and Keywords ▲

Citation ►

* TITLE Shrimp VMS Footprint Aggregation 2009-2013
CREATION DATE 2015-03-01 00:00:00
PUBLICATION DATE 2015-03-20 00:00:00

PRESENTATION FORMATS * digital map
FGDC GEOSPATIAL PRESENTATION FORMAT vector digital data

Hide Citation ▲

Citation Contacts ►

RESPONSIBLE PARTY
INDIVIDUAL'S NAME Richard Morse
ORGANIZATION'S NAME NOAA / NMFS / West Coast Region, Long Beach, CA
CONTACT'S POSITION GIS Analyst
CONTACT'S ROLE originator

CONTACT INFORMATION ►
PHONE
VOICE (562) 983-1390

ADDRESS
TYPE both
DELIVERY POINT 501 W. Ocean Blvd. Suite 4200
CITY Long Beach
ADMINISTRATIVE AREA CA
POSTAL CODE 90802
E-MAIL ADDRESS richard.morse@noaa.gov

HOURS OF SERVICE
M-F, 8:30 - 4:30

Hide Contact information ▲

Hide Citation Contacts ▲

Resource Details ►

DATASET LANGUAGES * English (UNITED STATES)
DATASET CHARACTER SET utf8 - 8 bit UCS Transfer Format

STATUS completed
SPATIAL REPRESENTATION TYPE * vector

* PROCESSING ENVIRONMENT Microsoft Windows 7 Version 6.1 (Build 7601) Service Pack 1; Esri ArcGIS 10.2.0.3348

CREDITS
VMS NOAA Office of Law Enforcement (OLE)

ARCGIS ITEM PROPERTIES
* NAME Shrimp VMS Footprint Aggregation 2009-2013
* SIZE 1.099
* LOCATION file://\\SWRLB4GGM1R1\C$\Users\ram\Working\Small\PinkShrimp\Build Density Map\Shrimp VMS Footprint Aggregation 2009-2013.shp
* ACCESS PROTOCOL Local Area Network

Hide Resource Details ▲

Extents ►

EXTENT
DESCRIPTION
From the Straight of Juan de Fuca in the north to the city of Oceanside, California in the south, and from the Pacific coast seaward to the -300 fathom depth contour.

GEOGRAPHIC EXTENT
BOUNDING RECTANGLE
EXTENT TYPE Extent used for searching
* WEST LONGITUDE -125.804294
* EAST LONGITUDE -116.797408
* NORTH LATITUDE 48.364240
* SOUTH LATITUDE 33.086591
* EXTENT CONTAINS THE RESOURCE Yes

TEMPORAL EXTENT
BEGINNING DATE 2015-04-01 00:00:00
ENDING DATE 2015-10-31 00:00:00

EXTENT IN THE ITEM'S COORDINATE SYSTEM
* WEST LONGITUDE -439491.909144
* EAST LONGITUDE 242284.272219
* SOUTH LATITUDE -536522.635200
* NORTH LATITUDE 1142918.402929
* EXTENT CONTAINS THE RESOURCE Yes

Hide Extents ▲

Resource Points of Contact ►

POINT OF CONTACT
INDIVIDUAL'S NAME Richard Morse
ORGANIZATION'S NAME NOAA / NMFS / West Coast Region, Long Beach, CA
CONTACT'S POSITION GIS Analyst
CONTACT'S ROLE originator

CONTACT INFORMATION ►
PHONE
VOICE (562) 983-1390

ADDRESS

TYPE both
DELIVERY POINT 501 W. Ocean Blvd. Suite 4200
CITY Long Beach
ADMINISTRATIVE AREA CA
POSTAL CODE 90802
E-MAIL ADDRESS richard.morse@noaa.gov

HOURS OF SERVICE
M-F, 8:30 - 4:30

Hide Contact information ▲

Hide Resource Points of Contact ▲

Resource Maintenance ►

RESOURCE MAINTENANCE
UPDATE FREQUENCY unknown

Hide Resource Maintenance ▲

Spatial Reference ►

ARCGIS COORDINATE SYSTEM
* TYPE Projected
* GEOGRAPHIC COORDINATE REFERENCE GCS_North_American_1983
* PROJECTION NAD_1983_Albers
* COORDINATE REFERENCE DETAILS
PROJECTED COORDINATE SYSTEM
X ORIGIN -16909700
Y ORIGIN -8597000
XY SCALE 266332319.7555542
Z ORIGIN -100000
Z SCALE 10000
M ORIGIN -100000
M SCALE 10000
XY TOLERANCE 0.001
Z TOLERANCE 0.001
M TOLERANCE 0.001
HIGH PRECISION true
WELL-KNOWN TEXT
PROJCS["NAD_1983_Albers",GEOGCS["GCS_North_American_1983",DATUM["D_North_American_1983",SPHEROID["GRS_1980",6378137.0,298.257222101]],PRIMEM["Greenwich",0.0],UNIT["Degree",0.0174532925199433]],PROJECTION["Albers"],PARAMETER["False_Easting",0.0],PARAMETER["False_Northing",-4000000.0],PARAMETER["Central_Meridian",-120.0],PARAMETER["Standard_Parallel_1",34.0],PARAMETER["Standard_Parallel_2",40.5],PARAMETER["Latitude_Of_Origin",0.0],UNIT["Meter",1.0]]

REFERENCE SYSTEM IDENTIFIER
* VALUE 0

Hide Spatial Reference ▲

Spatial Data Properties ►

VECTOR ►
* LEVEL OF TOPOLOGY FOR THIS DATASET geometry only

GEOMETRIC OBJECTS
FEATURE CLASS NAME Shrimp VMS Footprint Aggregation 2009-2013
* OBJECT TYPE composite
* OBJECT COUNT 178

Hide Vector ▲

ARCGIS FEATURE CLASS PROPERTIES ►
FEATURE CLASS NAME Shrimp VMS Footprint Aggregation 2009-2013
* FEATURE TYPE Simple
* GEOMETRY TYPE Polygon
* HAS TOPOLOGY FALSE
* FEATURE COUNT 178
* SPATIAL INDEX TRUE
* LINEAR REFERENCING FALSE

Hide ArcGIS Feature Class Properties ▲

Hide Spatial Data Properties ▲

Data Quality ►

DATA QUALITY REPORT - CONCEPTUAL CONSISTENCY ►
DIMENSION horizontal

MEASURE DESCRIPTION
These data were reviewed visually against the contours, shorelines, and EEZ boundaries used to create them and are believed to be logically consistent although no tests were performed.

EVALUATION METHOD
Indirect

Hide Data quality report - Conceptual consistency ▲

DATA QUALITY REPORT - COMPLETENESS OMISSION ►
MEASURE DESCRIPTION
Some polygons were determined to be related to vessel transit from harbors to fishing grounds and back, such as at the mouths of the Columbia River and Gray's Harbor, Washington, and Humboldt Bay, Oregon, but these polygons were not removed. Those using this data should keep this high traffic dynamic in mind when viewing polygons along shipping routes or at the mouth to busy harbors.

EVALUATION TYPE direct external
EVALUATION METHOD

Pattern recognition of points leading to and from, and clustered around the entrance to, ports, harbors, and river mouths.

Hide Data quality report - Completeness omission ▲

Hide Data Quality ▲

Lineage ►

LINEAGE STATEMENT
VMS data points of shrimp trawling vessle locations, covering the correct time of day, season, and years 2009 - 2013 were input into ArcGIS and then aggregated into footprints representing the point clouds.

PROCESS STEP ►
WHEN THE PROCESS OCCURRED 2014-10-02 00:00:00
DESCRIPTION
Data recorded recorded during the months of November through March were deleted from the data set
Data records recorded during the hours of 10:00 pm and 6:00 am were deleted from the data set

RATIONALE
Data points of interest include only those points recorded during the fishing season of April - October and during the hours of 6:00 am and 10:00 pm

Hide Process step ▲

PROCESS STEP ►
WHEN THE PROCESS OCCURRED 2014-10-17 00:00:00
DESCRIPTION
A study area polygon, extending from the US Pacific Coast of Washington,Oregon, and California out to the -300 fathom depth contour and from the Exclusive Economic Zone (EEZ) border with Canada to the EEZ border with Mexico, was used to select then save all points that fell within the study area.

RATIONALE
The project is only interested in US Waters out to the -300 fathom depth contour because these are the waters in which pink shrimp trawling activity was expected to be found based on Log Books and anecdotal industry input.

Hide Process step ▲

PROCESS STEP ►
WHEN THE PROCESS OCCURRED 2014-11-11 00:00:00
DESCRIPTION
Data points in waters seaward of the coastline that were not part of the open ocean, such as bays, harbors, and mouths to rivers and streams, were deleted from the data set.

RATIONALE

Points within bays, harbors, and in the mouths of tributaries were determined to be related to vessel time spent at anchor, in port, and in transit from harbors to fishing grounds and back,

Hide Process step ▲

PROCESS STEP ►
WHEN THE PROCESS OCCURRED 2015-01-14 00:00:00
DESCRIPTION
All remaining points, representing VMS locations for fishing hours and seasons for the years 2009 to 2013, were used to generate an aggregate footprint. This was done using the ArcGIS Aggregation Point Tool, using an aggregation distance of 1000 m.

RATIONALE
Earlier attempts to aggregate the points included using the ArcGIS point density tool, and using spatial join to combine grid squares to the points, which were then treated under a rule-of-three approach. The rule-of-three cell size of 1000 m produced coverage that closed most internal gaps and reduced fragmentation of cell clusters but did not combine larger, separate point clusters. The results of these approaches were compared to various iterations run with the aggregation point tool, which led to selection of the aggregation tool with an aggregation size of 1000 m as the best and most efficient approach for the process. This aggregation size produced the most consistent looking polygons at the scale of 1:1.1 million, which the final map product was produced at.

Hide Process step ▲

PROCESS STEP ►
WHEN THE PROCESS OCCURRED 2015-01-15 00:00:00
DESCRIPTION
A smoothing tool was used to remove the rough edges of the polygons generated by the aggregate points tool. The smoothing algorithm used was PAEK, with a tolerance of 2000 m.

RATIONALE
The polygons which result from the Aggregate Points Tool tend to have spiky corners where the footprints are strongly influenced by points at or beyond their edges. It was decided to use a smoothing tool to reduce the eccentricities of these spiky corners. The PAEK smoothing algorithm with a tolerance of 2000 m produced results that were the most consistent.

Hide Process step ▲

PROCESS STEP ►
WHEN THE PROCESS OCCURRED 2015-01-16 00:00:00
DESCRIPTION
Thinning Step: A field called "Area_sq_km" was inserted into the smoothed aggregation layer and the area in square kilometers was calculated. All polygons measuring less than 2 square kilometers were deleted from the layer.

RATIONALE

After using the smoothing tool, there were still a large number of very small polygons that cluttered up the area. It was determined that the smallest of these polygons were mostly the result of very small clusters of few points that were not part of larger aggregations and did not correlate with any clusters of rule-of-three grid squares tested earlier. It was decided that all polygons with an area smaller than 2 sq. km should be deleted.

Hide Process step ▲

SOURCE DATA ►
DESCRIPTION
VMS NOAA Office of Law Enforcement (OLE) provided by Kelly Spalding and Dennis Trager. Geographic extent of vessel activity when declared by the vessel captain as participating in the pink shrimp trawl fishery, gear code declaration #41. Current Essential Fish Habitat (EFH) closure areas from the Pacific Coast Groundfish Fishery Management Plan. Data collected for period Jan 1, 2009 to Dec. 31, 2013.

SOURCE MEDIUM NAME online link
Hide Source data ▲

Hide Lineage ▲

Geoprocessing history ►

PROCESS
PROCESS NAME
DATE 2015-01-15 14:20:46
TOOL LOCATION c:\program files\arcgis\desktop10.2\ArcToolbox\Toolboxes\Data Management Tools.tbx\CalculateField
COMMAND ISSUED
```
CalculateField "EFH Proposals 2014 Group Layer\MCI\FMA\Agg1000Comb2009_13_smooth" Id 1 VB #
```
INCLUDE IN LINEAGE WHEN EXPORTING METADATA No

PROCESS
PROCESS NAME
DATE 2015-01-15 14:22:19
TOOL LOCATION c:\program files\arcgis\desktop10.2\ArcToolbox\Toolboxes\Data Management Tools.tbx\CalculateField
COMMAND ISSUED
```
CalculateField "EFH Proposals 2014 Group Layer\MCI\FMA\Agg1000Comb2009_13_smooth" Id 2 VB #
```
INCLUDE IN LINEAGE WHEN EXPORTING METADATA No

PROCESS
PROCESS NAME
DATE 2015-01-15 14:22:41
TOOL LOCATION c:\program files\arcgis\desktop10.2\ArcToolbox\Toolboxes\Data Management Tools.tbx\CalculateField
COMMAND ISSUED
```
CalculateField "EFH Proposals 2014 Group Layer\MCI\FMA\Agg1000Comb2009_13_smooth" Id 3 VB #
```

INCLUDE IN LINEAGE WHEN EXPORTING METADATA No

PROCESS
PROCESS NAME
DATE 2015-01-15 14:23:01
TOOL LOCATION c:\program files\arcgis\desktop10.2\ArcToolbox\Toolboxes\Data Management Tools.tbx\CalculateField
COMMAND ISSUED
```
CalculateField "EFH Proposals 2014 Group Layer\MCI\FMA\Agg1000Comb2009_13_smooth" Id 4 VB #
```
INCLUDE IN LINEAGE WHEN EXPORTING METADATA No

PROCESS
PROCESS NAME
DATE 2015-01-15 14:23:27
TOOL LOCATION c:\program files\arcgis\desktop10.2\ArcToolbox\Toolboxes\Data Management Tools.tbx\CalculateField
COMMAND ISSUED
```
CalculateField "EFH Proposals 2014 Group Layer\MCI\FMA\Agg1000Comb2009_13_smooth" Id 5 VB #
```
INCLUDE IN LINEAGE WHEN EXPORTING METADATA No

PROCESS
PROCESS NAME
DATE 2015-01-15 14:23:48
TOOL LOCATION c:\program files\arcgis\desktop10.2\ArcToolbox\Toolboxes\Data Management Tools.tbx\CalculateField
COMMAND ISSUED
```
CalculateField "EFH Proposals 2014 Group Layer\MCI\FMA\Agg1000Comb2009_13_smooth" Id 6 VB #
```
INCLUDE IN LINEAGE WHEN EXPORTING METADATA No

PROCESS
PROCESS NAME
DATE 2015-01-15 14:24:11
TOOL LOCATION c:\program files\arcgis\desktop10.2\ArcToolbox\Toolboxes\Data Management Tools.tbx\CalculateField
COMMAND ISSUED
```
CalculateField "EFH Proposals 2014 Group Layer\MCI\FMA\Agg1000Comb2009_13_smooth" Id 7 VB #
```
INCLUDE IN LINEAGE WHEN EXPORTING METADATA No

PROCESS
PROCESS NAME
DATE 2015-01-15 14:24:41
TOOL LOCATION c:\program files\arcgis\desktop10.2\ArcToolbox\Toolboxes\Data Management Tools.tbx\CalculateField
COMMAND ISSUED
```
CalculateField "EFH Proposals 2014 Group Layer\MCI\FMA\Agg1000Comb2009_13_smooth" Id 8 VB #
```
INCLUDE IN LINEAGE WHEN EXPORTING METADATA No

PROCESS
PROCESS NAME
DATE 2015-01-15 14:24:56
TOOL LOCATION c:\program files\arcgis\desktop10.2\ArcToolbox\Toolboxes\Data Management Tools.tbx\CalculateField
COMMAND ISSUED
```
CalculateField "EFH Proposals 2014 Group Layer\MCI\FMA\Agg1000Comb2009_13_smooth" Id 9 VB #
```

INCLUDE IN LINEAGE WHEN EXPORTING METADATA No

PROCESS
PROCESS NAME
DATE 2015-01-15 14:25:17
TOOL LOCATION c:\program files\arcgis\desktop10.2\ArcToolbox\Toolboxes\Data Management Tools.tbx\CalculateField
COMMAND ISSUED
```
CalculateField "EFH Proposals 2014 Group Layer\MCI\FMA\Agg1000Comb2009_13_smooth" Id 10 VB #
```
INCLUDE IN LINEAGE WHEN EXPORTING METADATA No

PROCESS
PROCESS NAME
DATE 2015-01-15 14:25:38
TOOL LOCATION c:\program files\arcgis\desktop10.2\ArcToolbox\Toolboxes\Data Management Tools.tbx\CalculateField
COMMAND ISSUED
```
CalculateField "EFH Proposals 2014 Group Layer\MCI\FMA\Agg1000Comb2009_13_smooth" Id 11 VB #
```
INCLUDE IN LINEAGE WHEN EXPORTING METADATA No

Hide Geoprocessing history ▲

Distribution ►

DISTRIBUTION FORMAT
* NAME Shapefile
VERSION ArcGIS 10.2

TRANSFER OPTIONS
* TRANSFER SIZE 1.099

Hide Distribution ▲

Fields ►

DETAILS FOR OBJECT Shrimp VMS Footprint Aggregation 2009-2013 ►
* TYPE Feature Class
* ROW COUNT 178
DEFINITION
Title

DEFINITION SOURCE
NOAA/NMFS/WCR/SFD - Seattle

FIELD FID ►
* ALIAS FID
* DATA TYPE OID
* WIDTH 4
* PRECISION 0
* SCALE 0
* FIELD DESCRIPTION
Internal feature number.

* DESCRIPTION SOURCE
Esri

* DESCRIPTION OF VALUES
Sequential unique whole numbers that are automatically generated.

Hide Field FID ▲

FIELD Shape ►
* ALIAS Shape
* DATA TYPE Geometry
* WIDTH 0
* PRECISION 0
* SCALE 0
* FIELD DESCRIPTION
Feature geometry.

* DESCRIPTION SOURCE
Esri

* DESCRIPTION OF VALUES
Coordinates defining the features.

Hide Field Shape ▲

FIELD Id ►
* ALIAS Id
* DATA TYPE Integer
* WIDTH 6
* PRECISION 6
* SCALE 0
FIELD DESCRIPTION
Polygon Size Classification

DESCRIPTION SOURCE
NOAA Fisheries, WCR, Long Beach

LIST OF VALUES
VALUE 3
DESCRIPTION polygons between 2 and 3 square kilometers in size
ENUMERATED DOMAIN VALUE DEFINITION SOURCE NOAA/NMFS/WCR, Long Beach

VALUE 4
DESCRIPTION polygons between 3 and 4 square kilometers in size
ENUMERATED DOMAIN VALUE DEFINITION SOURCE NOAA/NMFS/WCR, Long Beach

VALUE 5
DESCRIPTION polygons between 4 and 5 square kilometers in size
ENUMERATED DOMAIN VALUE DEFINITION SOURCE NOAA/NMFS/WCR, Long Beach

VALUE 6
DESCRIPTION polygons between 5 and 6 square kilometers in size
ENUMERATED DOMAIN VALUE DEFINITION SOURCE NOAA/NMFS/WCR, Long Beach

VALUE 7
DESCRIPTION polygons between 6 and 7 square kilometers in size
ENUMERATED DOMAIN VALUE DEFINITION SOURCE NOAA/NMFS/WCR, Long Beach

VALUE 8
DESCRIPTION polygons between 7 and 8 square kilometers in size
ENUMERATED DOMAIN VALUE DEFINITION SOURCE NOAA/NMFS/WCR, Long Beach

VALUE 9
DESCRIPTION polygons between 8 and 9 square kilometers in size
ENUMERATED DOMAIN VALUE DEFINITION SOURCE NOAA/NMFS/WCR, Long Beach

VALUE 10
DESCRIPTION polygons between 9 and 10 square kilometers in size
ENUMERATED DOMAIN VALUE DEFINITION SOURCE NOAA/NMFS/WCR, Long Beach

VALUE 11
DESCRIPTION polygons larger than 10 square kilometers in size
ENUMERATED DOMAIN VALUE DEFINITION SOURCE NOAA/NMFS/WCR, Long Beach

ACCURACY INFORMATION
ACCURACY Polygon classified by number of square kilometers
MEASUREMENT FREQUENCY not planned

Hide Field Id ▲

FIELD Area_sq_km ►
* ALIAS Area_sq_km
* DATA TYPE Double
* WIDTH 11
* PRECISION 10
* SCALE 3
FIELD DESCRIPTION
Area of polygon in square kilometers

DESCRIPTION SOURCE
Generated within ArcGIS

ACCURACY INFORMATION
ACCURACY Area of polygon in square kilomters
MEASUREMENT FREQUENCY not planned

Hide Field Area_sq_km ▲

Hide Details for object Shrimp VMS Footprint Aggregation 2009-2013 ▲

Hide Fields ▲

Metadata Details ►

* METADATA LANGUAGE English (UNITED STATES)
* METADATA CHARACTER SET utf8 - 8 bit UCS Transfer Format

SCOPE OF THE DATA DESCRIBED BY THE METADATA * dataset
SCOPE NAME * dataset

* LAST UPDATE 2015-03-05

ARCGIS METADATA PROPERTIES
METADATA FORMAT ArcGIS 1.0
METADATA STYLE FGDC CSDGM Metadata
STANDARD OR PROFILE USED TO EDIT METADATA FGDC

CREATED IN ARCGIS FOR THE ITEM 2015-01-15 11:21:16
LAST MODIFIED IN ARCGIS FOR THE ITEM 2015-03-05 11:35:50

AUTOMATIC UPDATES
HAVE BEEN PERFORMED Yes
LAST UPDATE 2015-03-05 11:35:50

Hide Metadata Details ▲

Metadata Contacts ►

METADATA CONTACT
INDIVIDUAL'S NAME Richard Morse
ORGANIZATION'S NAME NOAA / NMFS / West Coast Region, Long Beach, CA
CONTACT'S POSITION GIS Analyst
CONTACT'S ROLE originator

CONTACT INFORMATION ►
PHONE
VOICE (562) 983-1390

ADDRESS
TYPE both
DELIVERY POINT 501 W. Ocean Blvd. Suite 4200
CITY Long Beach
ADMINISTRATIVE AREA CA
POSTAL CODE 90802
E-MAIL ADDRESS richard.morse@noaa.gov

HOURS OF SERVICE
M-F, 8:30 - 4:30

Hide Contact information ▲

Hide Metadata Contacts ▲

Metadata Maintenance ►

MAINTENANCE
UPDATE FREQUENCY unknown

Hide Metadata Maintenance ▲

Metadata Constraints ►

CONSTRAINTS
LIMITATIONS OF USE
This data layers is not intended as a definitive identification of pink shrimp bottom trawl effort, but instead is intended to infer an improved spatial footprint utilizing VMS data than is currently available. The pink shrimp VMS data set largely resolves outstanding data-gaps and uncertainties of the spatial extent of pink shrimp trawl effort. For more information please refer to the associated metadata document.

Hide Metadata Constraints ▲