

Model based Spatial for Monitoring Surveillance of Fisheries to Ward Illegal Fishing in Waters of Eastern Indonesian

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ABSTRACT

This study was presented as an initial step (pilot project) in monitoring the availability of the model based spatial for surveillance of fisheries to deter illegal fishing in the termination of the operation and inspection of fishing ship in waters of eastern Indonesia. The purpose of the study was the establishment of the monitoring model based spatial surveillance of fisheries to deter illegal fishing operations in waters of eastern Indonesia. The method in the study were (1) descriptive analysis, associated with collecting and summarizing the data, and presenting the results of summarization, so as to know the character of a data set, and make the data more informative. (2) analysis of databases with Geographic Information Systems (GIS) using ArcView 3.3 software. In principle the processing of data with geographic information systems (GIS) are data entry, data analysis and data display. The result of this study is the model based spatial for surveillance of fisheries waters of eastern Indonesia.

KEYWORDS: GIS, surveillance, model based spatial, the termination of the operation and inspection.

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I. INTRODUCTION

From the cessation of activities and fishing vessel inspection (*henrikan*) are certainly numerous fisheries data can be multi-year in-depth study and used as a base in the manufacture and development of model-based spatial database in connection with the illegal fishing in the waters of Eastern Indonesia. As a first step (pilot project) in monitoring the availability of model-based spatial surveillance of fisheries to deter illegal fishing in the cessation of operations and inspection vessel in the waters off eastern Indonesia Fish. This research is important in an effort to provide information on the status and development of capture fisheries to develop Model Monitoring Surveillance of Fisheries (MSF) or monitoring and surveillance of fisheries resources in an effort to apply the system Monitoring, Controlling, and Surveillance (MCS) as required code Of Conduct For Responsible Fisheries (CCRF).

The reason is that the effort to develop a model-based monitoring spatial surveillance of fisheries to deter illegal fishing in the cessation of operations and vessel inspection eastern Indonesian waters, it is a more integrated, so that the data and information obtained in the performance of *henrikan* be more organized and accessible quickly and easily by interested parties, so that the management of fishery resources in the study area can be implemented on an ongoing basis. The purpose of this study was the establishment of Fisheries Surveillance Monitoring Model to counteract illegal fishing in the termination of the operation and inspection of fishing vessels in Eastern Indonesian waters. The results of this study will hopefully contribute to marine science and fisheries that can be used to study other related sciences, such as oceanography, arrest and post-harvest.

II. RESEARCH METHODS

The study was conducted over 10 months. The research location is the East Indonesian waters. Materials or data used in this study include: *Henrikan* spatial database in Eastern Indonesian waters, the amount and type of fish, the number of fishing fleet, and map position *henrikan* fishery management area. The tools used in the manufacture and processing of the model is a spatial data processing software ArcView. Data analysis using descriptive analysis by collecting and summarizing the data, and presenting the results of summarization, so as to know the character of a data set, and make the data more informative. Analysis of spatial models with Geographic Information Systems (GIS) are used to store and manipulate data manually

berreferensi geografis. With these capabilities, GIS technology is very useful in the management of coastal and marine resources spatially (Prasita and Rauf, 2006).

III. RESULT AND DISCUSSION

3.1 Making Model-Based Monitoring Surveillance of Fisheries Spatial In Discontinued Operations and Vessel Inspection Fish in Waters of Eastern Indonesian

Monitoring modeling spatial-based surveillance of fisheries to deter illegal fishing has been done based fishery management area maps (wilayah pengelolaan perikanan/WPP) in the waters of eastern Indonesia, which is divided into 6 region is as follows:

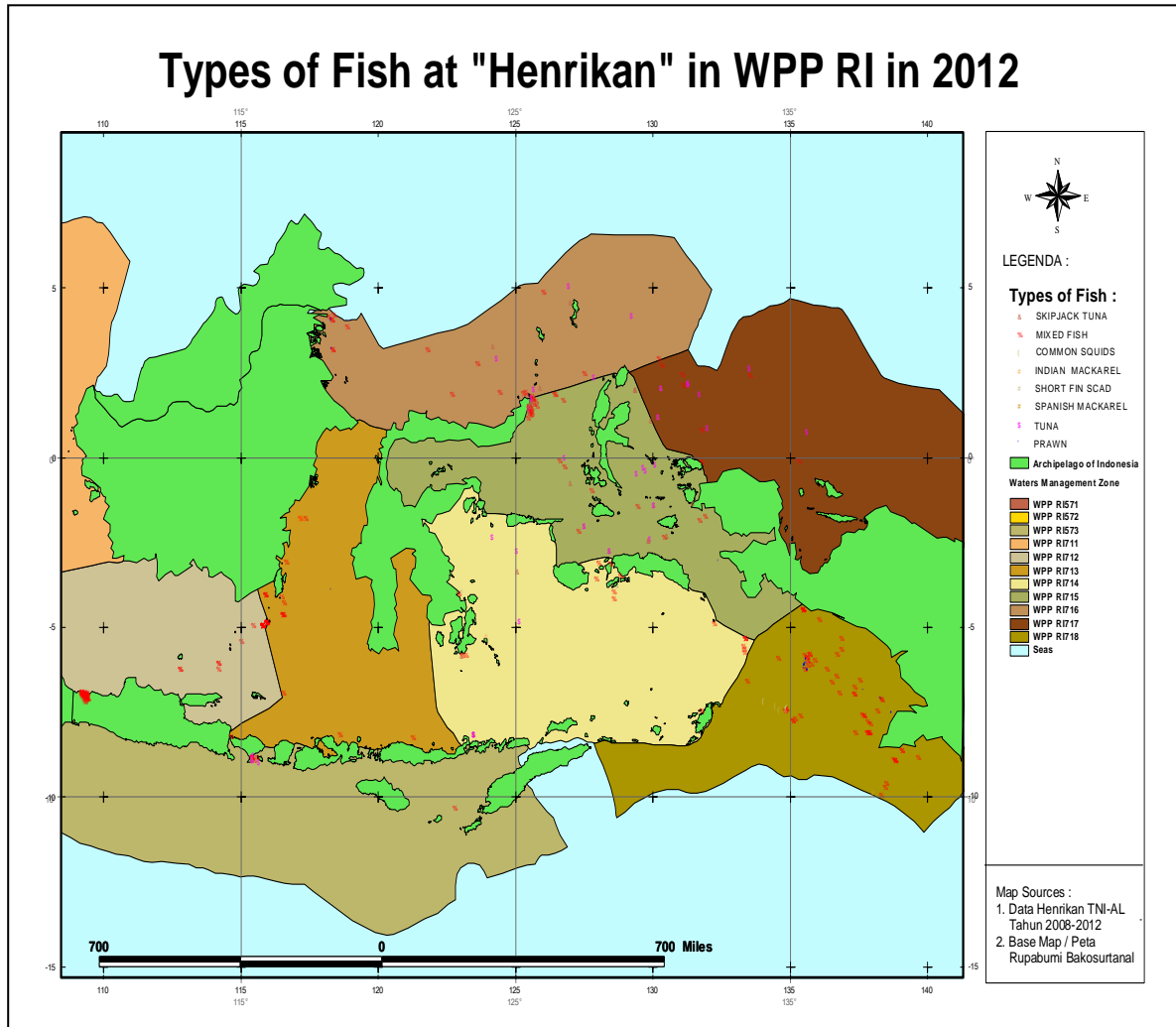
1. WPP-RI 713 : Selat Makasar, Teluk Bone, Laut Flores dan Laut Bali
2. WPP-RI 714 : Teluk Tolo dan Laut Banda
3. WPP-RI 715 : Teluk Tomini, Laut Maluku, Laut Halmahera, Laut Seram dan Teluk Berau
4. WPP-RI 716 : Laut Sulawesi dan sebelah utara Pulau Halmahera
5. WPP-RI 717 : Teluk Cendrawasih dan Samudera Pasifik
6. WPP-RI 718 : Laut Aru, Laut Arafura dan Laut Timor bagian timur.

3.1.1 Model-Based Spatial for Monitoring Surveillance of Fisheries in “Henrikan” Operation based on the Types of Fish in WPP RI

Model-based Monitoring Surveillance of Fisheries spatial, based on the type of fish recorded in henrikan operation for a period of 5 years (2008-2012) of each of its WPP can be seen in Table 1 and Figure 1. Dominant fish species in all WPP in 2012 is a type of fish groups mixture. They are shown in the map of types of fish in Figure 1.

Table 1. Table groups / types of fish in Operation Henrikan at each Regional Fisheries Management (WPP) in the waters of Eastern Indonesia (2008-2012)

WPP	Group/Type of Fish			Dominan Type
	Indonesian Name	International Name	Latin Name	
713	1. Ikan campuran	Mixed fish	---	Mixed fish
	2. Cakalang	Skipjack tuna	<i>Katsuwonus pelamis</i>	
	3. Udang	Prawn	<i>Penaeus</i> sp	
	4. Cumi cumi	Common squids	<i>Loligo</i> sp	
	5. Tuna	Tuna	<i>Thunnus</i> sp	
714	1. Ikan campuran	Mixed fish	---	Mixed fish
	2. Tuna	Tuna	<i>Thunnus</i> sp	
	3. Udang	Prawn	<i>Penaeus</i> sp	
	4. Cakalang	Skipjack tuna	<i>Katsuwonus pelamis</i>	
	5. Cumi cumi	Common squids	<i>Loligo</i> sp	
	6. Layur	Hairtails	<i>Trichiurus</i> spp	
715	1. Ikan Campuran	Mixed fish	---	Mixed fish
	2. Tuna	Tuna	<i>Thunnus</i> sp	
	3. Cakalang	Skipjack tuna	<i>Katsuwonus pelamis</i>	
	4. Udang	Prawn	<i>Penaeus</i> sp	
	5. Kembung	Indian mackerel	<i>Rastreliger</i> sp	
	6. Cumi cumi	Common squids	<i>Loligo</i> sp	
716	1. Ikan Campuran	Mixed fish	---	Mixed fish
	2. Tuna	Tuna	<i>Thunnus</i> sp	
	3. Cakalang	Skipjack tuna	<i>Katsuwonus pelamis</i>	
	4. Udang	Prawn	<i>Penaeus</i> sp	
	5. Kembung	Indian mackerel	<i>Rastreliger</i> sp	
	6. Cumi cumi	Common squids	<i>Loligo</i> sp	
	7. Tenggiri	Spanish mackerel	<i>Scomberomorus commerson</i>	
717	1. Ikan Campuran	Mixed fish	---	Mixed fish
	2. Tuna	Tuna	<i>Thunnus</i> sp	
	3. Cakalang	Skipjack tuna	<i>Katsuwonus pelamis</i>	
	4. Udang	Prawn	<i>Penaeus</i> sp	
	5. Kembung	Indian mackerel	<i>Rastreliger</i> sp	
718	1. Ikan Campuran	Mixed fish	---	Mixed fish
	2. Tuna	Tuna	<i>Thunnus</i> sp	
	3. Cakalang	Skipjack tuna	<i>Katsuwonus pelamis</i>	
	4. Udang	Prawn	<i>Penaeus</i> sp	
	5. Kembung	Indian mackerel	<i>Rastreliger</i> sp	
	6. Cumi cumi	Common squids	<i>Loligo</i> sp	
	7. Tenggiri	Spanish mackerel	<i>Scomberomorus commerson</i>	
	8. Layang	Shortfin scad	<i>Decapterus</i> sp	



3.1.2 Model Based Spatial for Monitoring Surveillance of Fisheries in “Henrikan” Operation based on the Number of Fish Charges in WPP RI

Model-based Monitoring Surveillance of Fisheries spatial, based on the number of fish in “Henrikan” operation charge for a period of 5 years (2008-2012) of each of its WPP can be seen in Figure 2. At spatial models below can be seen that the number of fish examined in charge of the operation Henrikan between the years of 2008-2012 spread over 713 to 718 WPP. Distribution sequentially from the highest high to the lowest in the WPP 718 (Aru Gulf waters, the Arafura Sea and the Timor sea East) followed by WPP 715 (Tomini Gulf waters, the Maluku Sea, Halmahera Sea, Seram Sea and the Gulf of Berau), 716 (marine waters of Sulawesi and Halmahera Northern), 713 (Makassar Strait, Gulf of Bone, Flores Sea and the Sea of Bali) and 717 (Aquatic Paradise Bay and the Pacific Ocean). From the spatial model can be analyzed that the activities can be carried out with priority “Henrikan” to WPP RI number 718, 715 and 716.

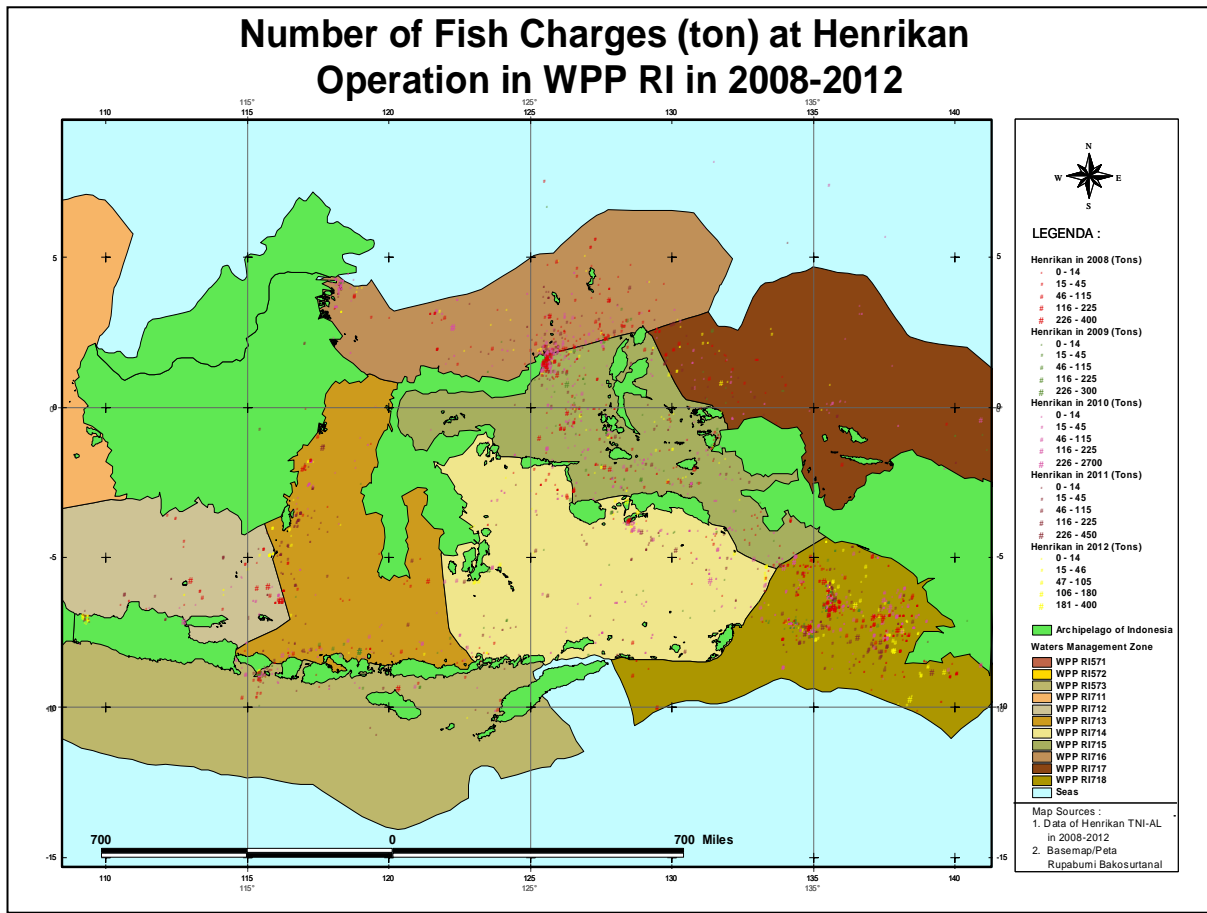


Figure 2. Number of Fish Charges (tons) at Henrikan Operation in WPP RI in 2008-2012

1.1.3 Model Based Spatial for Monitoring Surveillance of Fisheries in “Henrikan” Operation based on Country Flags in WPP RI

Model-based Monitoring Surveillance of Fisheries spatial, based on the state flag Henrikan operation for a period of 5 years (2008-2012) of each of its WPP can be seen in Figure 3. At spatial models below can be seen that ship with the flag of the country that is checked in the operation Henrikan between the years of 2008-2012 spread over 713 to 718 WPP.

Grouping the ship is divided into two Indonesian-flagged vessels and non-Indonesian flagged vessels. Indonesian-flagged vessels from 2008-2012 scattered all WPP namely: WPP 718 (Aru Gulf waters, the Arafura Sea and the Timor Sea East) followed by WPP 715 (Waters Tomini, Molucca Sea, Sea Halmahera, Seram Sea and the Gulf of Berau), 716 (marine waters Northern Sulawesi and Halmahera), 713 (Makassar Strait, Gulf of Bone, Flores Sea and the Sea of Bali) and 717 (Aquatic Paradise Bay and the Pacific Ocean). While a non Indonesian-flagged vessels are found in the 713-718 WPP in 2011.

From the spatial model can be analyzed that the activities Henrikan are dominated by Indonesian flagged vessels. It can be seen in the map in Figure 3.

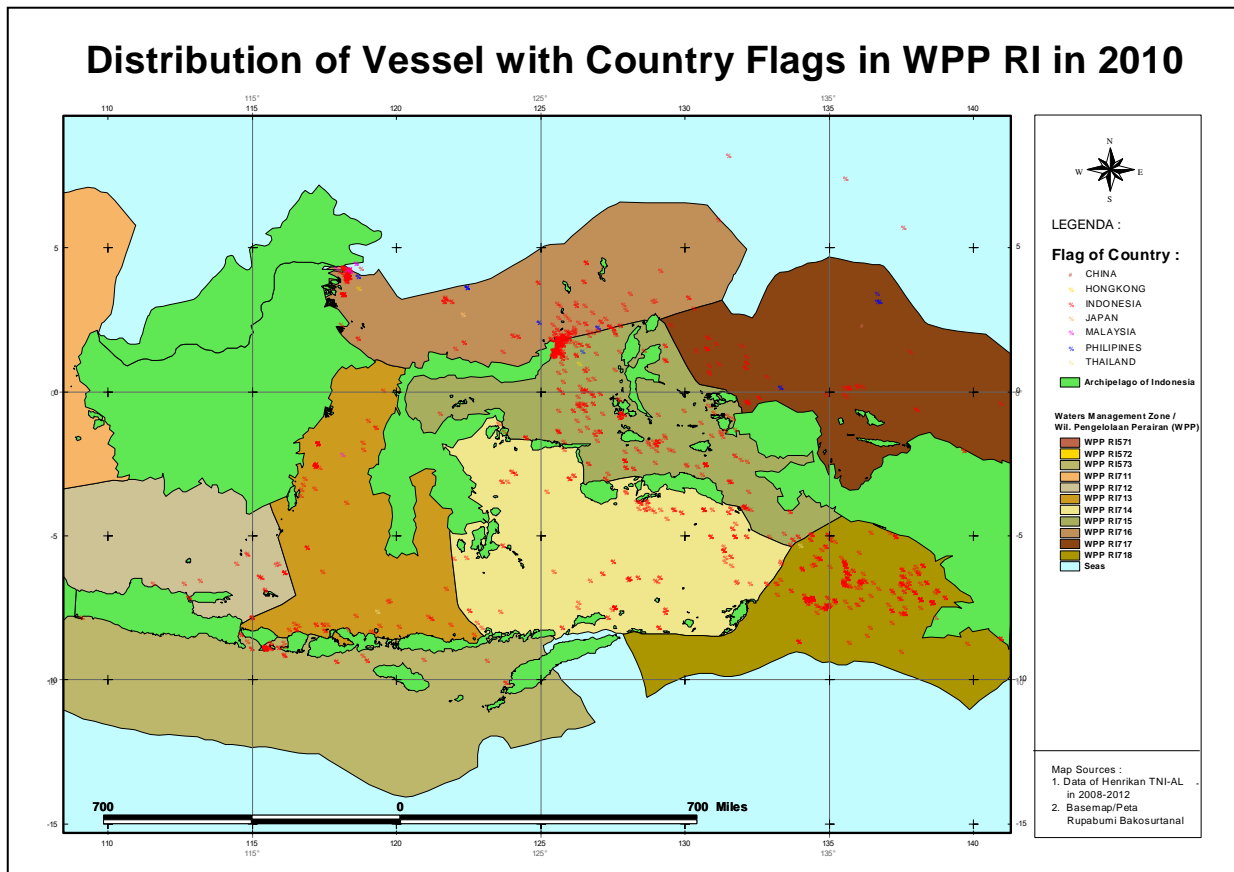


Figure 3. Distribution of Vessel with Country Flags in WPP RI in 2010

3.1.4 Model Based Spatial for Monitoring Surveillance of Fisheries in “Henrikan” Operation based on Seasons in WPP RI

Model-based Monitoring Surveillance of Fisheries spatial, seasonal Henrikan in operation for a period of 5 years (2008-2012) of each of its WPP can be seen in table 2 and figure 4. At spatial models below can be seen that the operation Henrikan between 2008-2012 there is at 4 seasons are: winter West (January-March), transition I (April-June), the East (July-September) and the Transitional I (October-December) and spread over 713 to 718 WPP. Operating henrikan dominant season and Transition II East season Grouping vessel is divided into two Indonesian-flagged vessels and non-Indonesian flagged vessels. Operations performed on the season Henrikan dominant Western and Transition II at WPP 718 (Aru Gulf waters, the Arafura Sea and the Timor Sea East) and WPP 715 (Waters Tomini, Molucca Sea, Sea Halmahera, Seram Sea and the Gulf of Berau), at WPP 716 (marine waters of Sulawesi and Halmahera North side) on the East and inbetween the first season, at WPP 713 (Makassar Strait, Gulf of Bone, Flores Sea and the Sea of Bali) on the season and in the WPP transition II 717 (Aquatic Paradise Bay and the Pacific Ocean) on Transitional season II and East.

Table 2. Distribution Operations at WPP Henrikan by Season, 2008-2012

WPP	Dominan Seasons	Years					Number	Dominan
		2012	2011	2010	2009	2008		
713	Winter West	✓					1	1. Transitional II 2. Winter East
	Transitional II	✓	✓		✓	✓	4	
	Winter East			✓			1	
	Transitional I		✓	✓			2	
714	Winter West		✓				1	
	Transitional II	✓	✓	✓	✓	✓	5	
	Winter East	✓		✓		✓	3	
	Transitional I				✓		1	
715	Winter West	✓	✓	✓	✓		4	
	Transitional II	✓	✓	✓	✓	✓	5	
	Winter East			✓		✓	2	
	Transitional I		✓	✓		✓	3	
716	Winter West	✓	✓			✓	3	
	Transitional II					✓	1	
	Winter East		✓	✓	✓	✓	4	
	Transitional I	✓	✓	✓		✓	4	
717	Winter West			✓			1	
	Transitional II	✓		✓	✓		3	
	Winter East		✓		✓	✓	3	
	Transitional I	✓	✓				2	
718	Winter West	✓	✓	✓	✓	✓	5	
	Transitional II	✓		✓	✓	✓	4	
	Winter East			✓	✓	✓	3	
	Transitional I		✓		✓	✓	3	

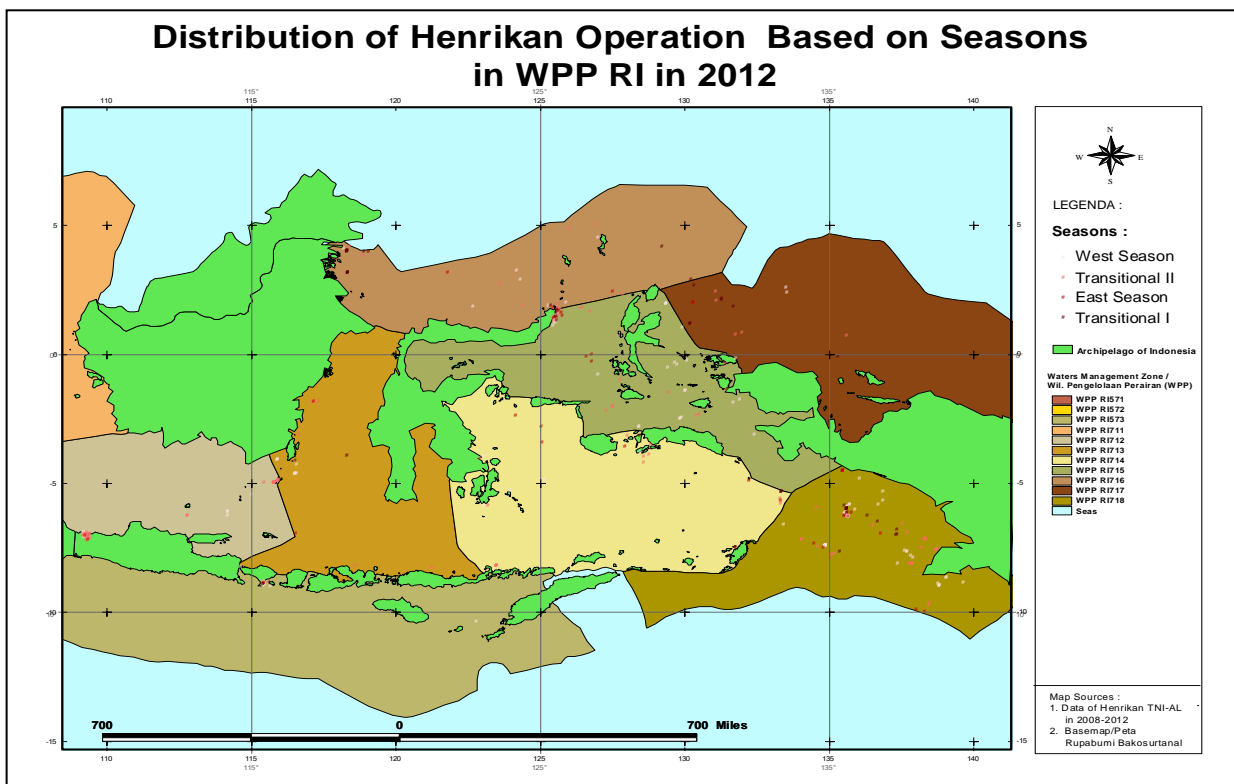


Figure 4. Distribution of “Henrikan” Operation based on Seasons in WPP RI in 2012

IV. CONCLUSION AND SUGGESTION

From the results of this study concluded:

- [1] Model-based spatial for monitoring surveillance of Fisheries in the “Henrikan” operations based on the group / type in WPP RI Fish is dominated the fish mixture.
- [2] Model-based spatial for monitoring surveillance of fisheries in the “Henrikan” operations based seasons in WPP RI is dominated by the East season and Transition II.
- [3] Surveillance of fisheries monitoring model based spatial in “Henrikan” operation based on State Flag WPP RI is dominated by the Indonesian flag.
- [4] Surveillance of Fisheries Monitoring Model Based on Spatial Henrikan based Payload Operation Fish (tons) is dominated at WPP WPP RI number 718, 715 and 716.

Suggestion:

To find comprehensive information suggested that a more in-depth research on illegal fishing in the waters of eastern Indonesia on an ongoing basis.

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