

# Pearl Farms GIS Manihiki – Cook Islands



Edwin Liava'a  
SPC/SOPAC  
Technical Support – GIS/RS



# Introduction

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- Questions

A co-joined initiative by Ben Ponia (Secretary of Marine Resources for the Cook Islands), Mr. Robert Jimmy, Aquaculture Adviser, Mr. Phil Bright, GIS Specialist (Census and Surveys), SPC/SOPAC Technical Support GIS/RS, funded by the SPC's Division of Fisheries, Aquaculture and Marine Ecosystems (FAME) and the Ministry of Marine Resources (MMR), Cook Islands.

A photograph showing a man in an orange shirt and a woman in a yellow shirt leaning over a table. They are sorting through a large pile of black pearls spread out on a white cloth. The man is on the left, looking down at the pearls. The woman is on the right, also looking down. In the background, there is a large metal pot and some other items on the table.

**It is estimated that the annual production from Manihiki is on the order of NZ\$12 million dollars or 250,000 pearls.**

*Manihiki Atoll black pearl farm census and mapping survey  
Ben Ponia, Tangi Napara, Martin Ellis, Ravengakore Tuteru*

# Why GIS

Cook Islands cultured pearls are one of most valued export industry for the country.

It is based on cultivating the black-lip pearl oyster in some of the island atolls and it is centred at Manihiki atoll.

To assist the ecological sustainability of the pearl industry and the Manihiki lagoon-wide management measures.

# GIS - Solution

- To ensure the sustainability of the pearl industry, a MIS/GIS system must be in-placed for management measures of:
  - Enabling tenure of farm leases to be allocated so that pearl shells are evenly distributed to ensure that overstocking or "disease hotspots" do not occur.
  - Relieve farmers expressed frustration at being forced to overstock their farm area because of neighbouring farmers who have increased their boundaries without fully utilising the area already available.
  - Establishing a system for allocating farm boundaries that can be readily referenced and distributed on a fair basis.
  - Providing sustainable management of pearl farms census data and archival.







110m  
3 110m  
Seedling 3 110m  
4 110m  
5 110m

1 110m  
2 110m  
3 110m  
4 110m  
5 110m  
6 110m  
7 110m  
8 110m  
9 110m

HARU HARU 3

Virgin shells 3

2



# Data Capture

- Every farm line has a starting or anchor point (ANC\_PT) and an end point (END\_PT) with some mid points (MID\_PT).
- Divers were used to mark these points using ropes and buoys on a straight line to the surface of the ocean.
- These buoys were then mapped using the Trimble Juno series GPS with differential corrections in a range of 1 – 2 meters and 2 – 5 meters accuracy.
- Lines were then digitized to connect these points to depict the pearl farm lines with a centric buffer zone radius of 7 meters as the recommended spacing between farm lines.





110m  
3 110m  
Seedling 3 110m  
4 110m  
5 110m

1 110m  
2 110m  
3 110m  
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5 110m  
6 110m  
7 110m  
8 110m  
9 110m

HARUHARU 3 110m  
Virgin shells 3 110m

2



Apply geo-science and technology to realise new opportunities for improving the livelihoods of Pacific communities.





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# Updates

- Customised GIS
- In the process of redistributing new boundaries and this time avoiding any overlap
- Consultations with farmers one on one so they could see their lines, and show them if they wanted to expand
- The island council are issuing new permits for the next 5 year period
- Completed data capture using GPS - 90% of Active Farmers and 50% of All farms



# TEKAKE WILLIAM

First Record

Last Record

Previous Record

Next Record

Add New

Delete Record

Save Record



Run MMR.MBX

Firstname:   
 Lastname:   
 DOB:   
 Has Farm: ☒  
 Permit Number:   
 Payment Date:   
 Permit Holder:

Farm ID:   
 Size:  Hactares  
 Village:   
 Resident:   
 Comments:   
 Photo Path:

Tasks

Updates

Database Logon

Username:   
 Password:

Ministry of Marine Resources  
 GOVERNMENT OF THE COOK ISLANDS

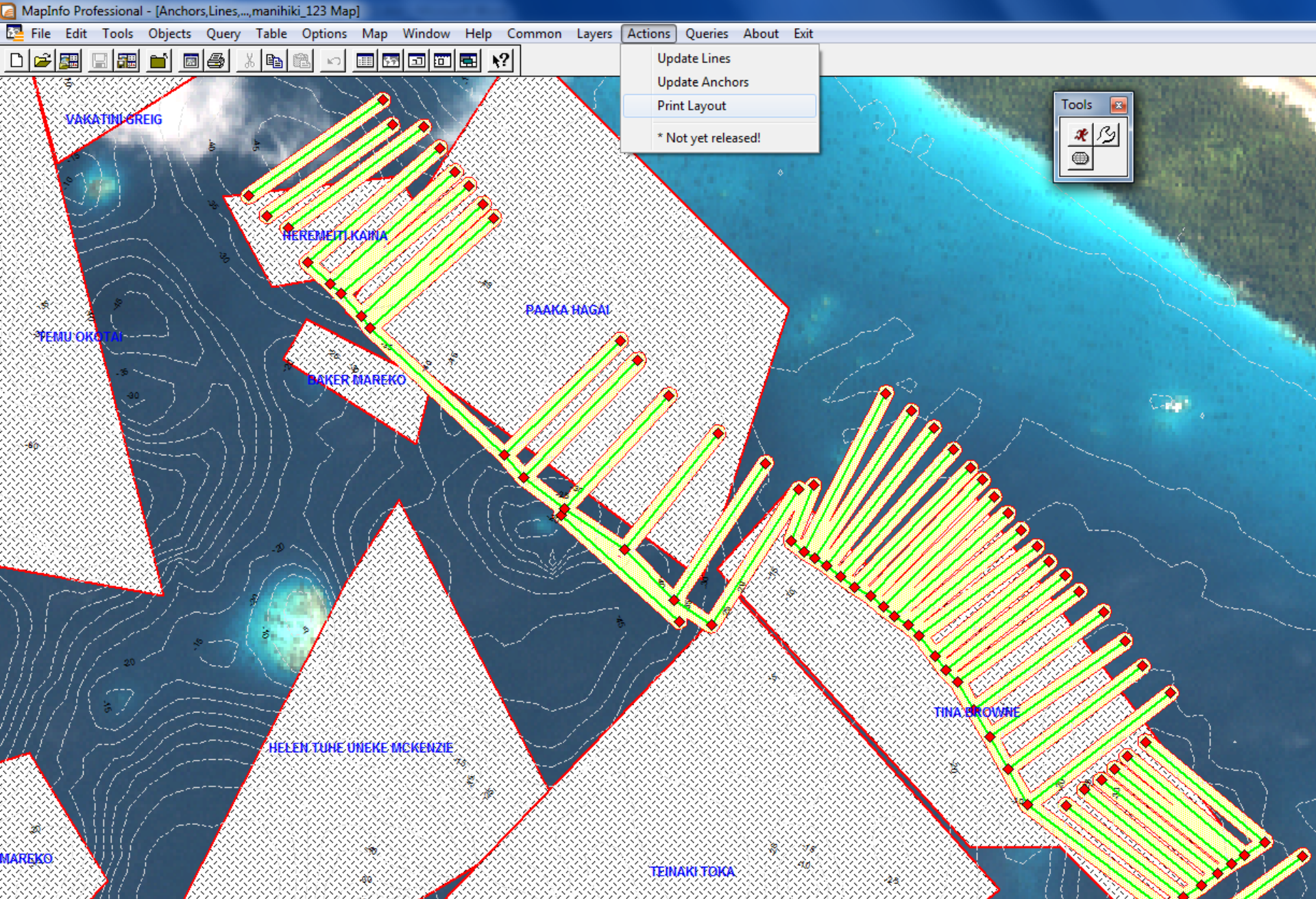
Lines Information

Line_ID	Line_Type	Length	N_Chap
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193	UNKN	142.268085299027	
194	UNKN	201.008075505028	
195	UNKN	181.014249814768	0
196	UNKN	444.09053905755	0
197	UNKN	436.943928189421	0
198	UNKN	430.316532432589	0
199	UNKN	426.604358308707	0
200	UNKN	456.86299163262	0
201	UNKN	351.243431107744	0
202	UNKN	192.038131072325	0
203	UNKN	186.23198981161	0

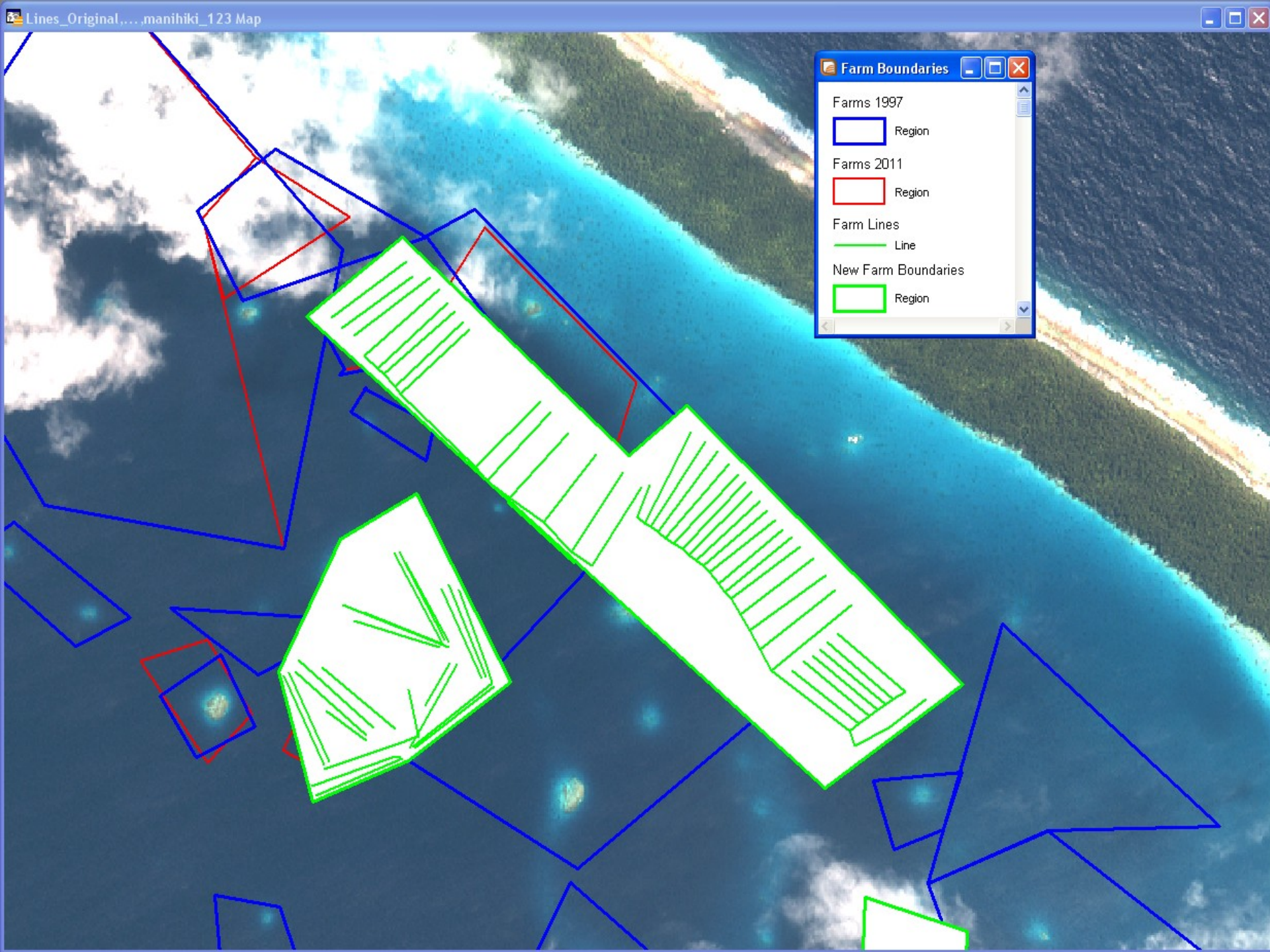
N_Conditior	N_Seeded	Seeding_ID	N_Mabes	N_Keshis	N_Re
0	0	0	0	0	0
0	0	0	0	0	0
0	0	0	0	0	0
0	0	0	0	0	0
0	0	0	0	0	0
0	0	0	0	0	0
0	0	0	0	0	0
0	0	0	0	0	0
0	0	0	0	0	0
0	0	0	0	0	0
0	0	0	0	0	0
0	0	0	0	0	0

Record: 1 of 33  
 Record: 135 of 137









**Farm Boundaries**

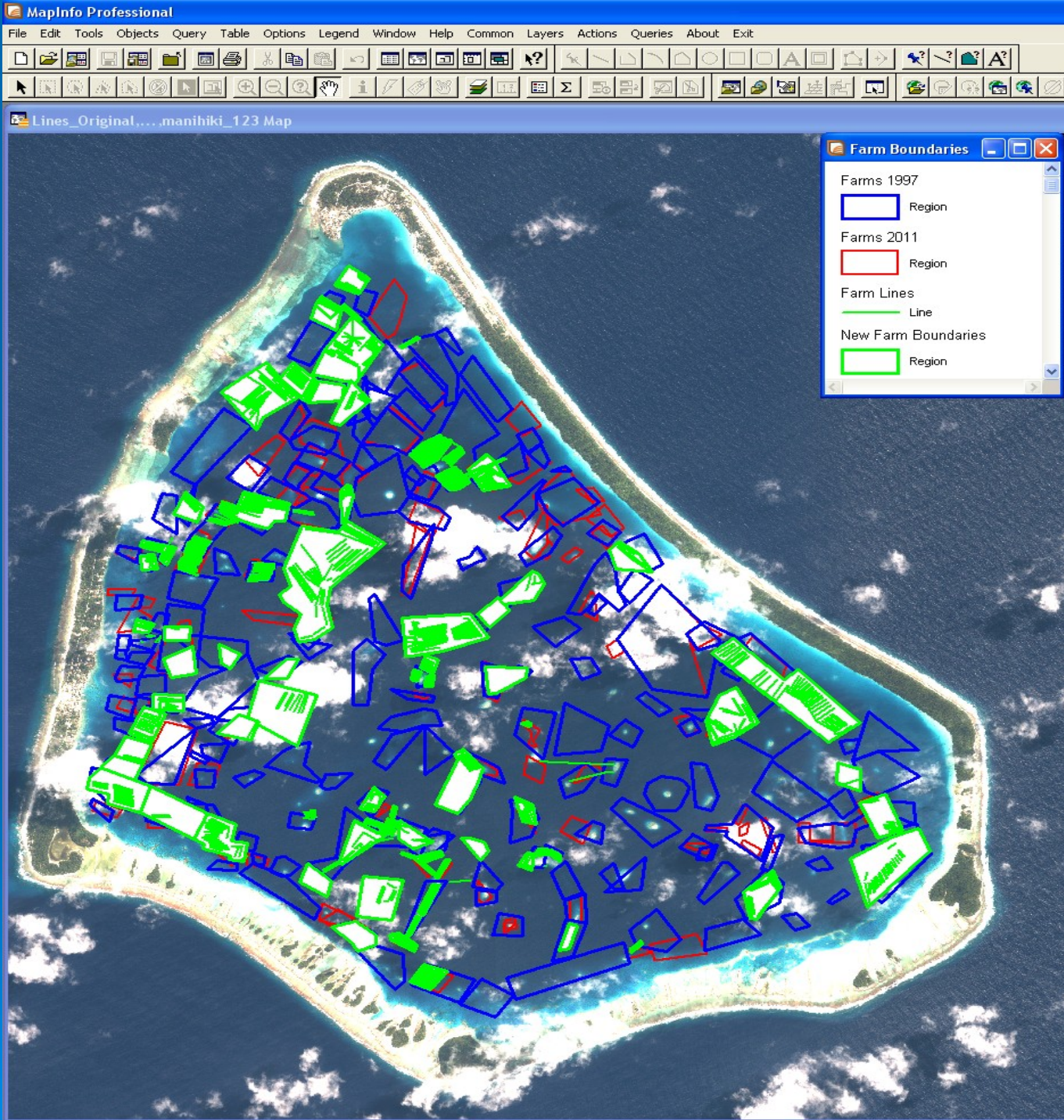
Farms 1997  
Region

Farms 2011  
Region

Farm Lines  
Line

New Farm Boundaries  
Region





# Summary

System Operational

Pearl Census

Not only survey the farm lines but also the farmer

# VINAKA!