

The Great East Japan Earthquake

The City That Experienced Triple Disaster

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OVERVIEW OF GREAT EAST JAPAN EARTHQUAKE

On March 11th 2011, the Great East Japan Earthquake occurred in northeastern Japan. The epicenter was at the Pacific Sanriku offshore (Map 1). Soon after, a tsunami impacted and destroyed a broad swath of the coast. From the destruction of the earthquake and tsunami, the Fukushima Daiichi Nuclear Power Plant (FINPP) exploded and caused a nuclear crisis with a long term impact to the area in Fukushima.

Main Shock Summary			
Location	38.297°N	142.373°E	
Magnitude	9.1		
Depth	29 km		
Origin Time	3/11/2011	2:46:24 PM (Tokyo Time)	
Max Tsunami	40m High	10 km Interior	
Casualty	20,000 +		
Buildings Damage	270,000 +		
Evacuee Pop	400,000 +		



OVERVIEW OF STUDY AREA / PROJECT SCOPE

Iwaki City, Fukushima was affected by the earthquake and tsunami, yet accepts evacuees from the “difficult-to-return zone” which is within 30km from the nuclear power plant.

Iwaki City is...

- 1,232 km² large and has more than 30,000 people.
- Located 30 km south from FINPP (Map 2).
- Currently accepting 20,000 evacuees from “difficult-to-return zone”.

Project Scope...

- Introduce the damage and the recovery in Iwaki City, focusing on population change and physical recovery.

DAMAGE IN IWAKI CITY

Main Shock Damage in Iwaki City...

- Scale was 6 Lower (Table 1).
 - The highest tsunami was 8.57m in Toyoma-neighborhood (Map 2, Map3 - 3).
 - 464 Dead (Table 2).
 - Water infrastructure took a month to recover.
 - Many Iwaki citizens chose to evacuate from Iwaki by themselves due to fear of radiation poisoning.
 - Repeated aftershocks throughout following months.
- *See table 2 for human and building damage in Iwaki.

Iwaki had a harder time obtaining relief supplies and volunteers than other affected areas due to the radiation rumor.

Major Aftershocks in Iwaki...

- Scale 6 Lower (x2).

- Scale 5 Upper/Lower (x5 each).

- Scale 4 (x64).

(After shock data from 7/1/2015)

Human and Building Damage		
Loss of Lives	Direct Death	293
	Related Death	134
	Missing People	37
	Reported as Death	37
Total		464
Residence Damage (Number of Residential Buildings)	Complete Destruction	7902
	Large Scale Destruction	9253
	Half Destruction	33146
	Partial Destruction	40879
Total		91180

Table 2

Scale Category of Earthquake in Japan		
SCALE	DESCRIPTION	
0	Imperceptible to people	
1	Felt Slightly by some people in the building	
2	Felt by many people. Suspended objects sway.	
3	Felt by most people in buildings.	
4	<ul style="list-style-type: none">• Most people are startled. Hanging objects swings significantly.• Unstable ornaments may fall.	
5 LOWER	<ul style="list-style-type: none">• Many people are frightened and feel the need to hold onto something stable.• Unsecured furniture may move, and unstable furniture may topple over.	
5 UPPER	<ul style="list-style-type: none">• Difficult to remain standing.• Many unsecured furniture moves and topple over.• Wall tiles and windows may sustain damaged and fall.	
6 LOWER	<ul style="list-style-type: none">• Difficult to remain standing.• Many unsecured furniture moves and topple over.• Wall tiles and windows may sustain damaged & fall.• In wooden houses with low earthquake resistance, tiles may fall and buildings may lean or collapse.	
6 UPPER	<ul style="list-style-type: none">• Impossible to move without crawling. People may be thrown through the air.• Most unsecured furniture moves and topples over.• Large cracks may form, and large landslides and massif collapses may be seen.	
7	<ul style="list-style-type: none">• Wooden houses with high earthquake resistance may also lean.• Reinforced-concrete buildings with low earthquake resistance may collapse.	

Table 1

1 Hisanohama Residential Area



- Hisanohama was influenced by earthquake, tsunami, and fire.
- Since Hisanohama is located within 30km from the FINPP, a lot of people were isolated at this place.



- Damaged area was cleaned.
- Destroyed bridges and Hisanohama port were rebuilt.
- Pine trees are planted now.
- Slowly recovering



3 Toyoma Residential Area, Toyoma Middle School



- Toyoma was hit by the highest tsunami in Iwaki City.
- The structure of the middle school remained but the inside was damaged.
- 194 people lost their lives and many people lost their houses.



- Middle school was torn down, and all debris cleaned.
- Residents moved to different places (eg. temporary homes).
- The city is planning to build a new community.



2 Yotsukura Port



- The port and local markets were damaged and inundated.



- All the roads and local markets are recovered,
- On going construction at the port and beach to build seawalls.



4 Onahama Port and Industrial/Commercial District



- Onahama has the biggest international port in Fukushima Prefecture.
- The huge ships were pushed out from the ocean.
- Commercial areas and aquamarine were inundated.



- The port is recovered with new seawalls.
- New commercial districts are under construction.

5 Jyoban-Highway



6 Nakoso Port



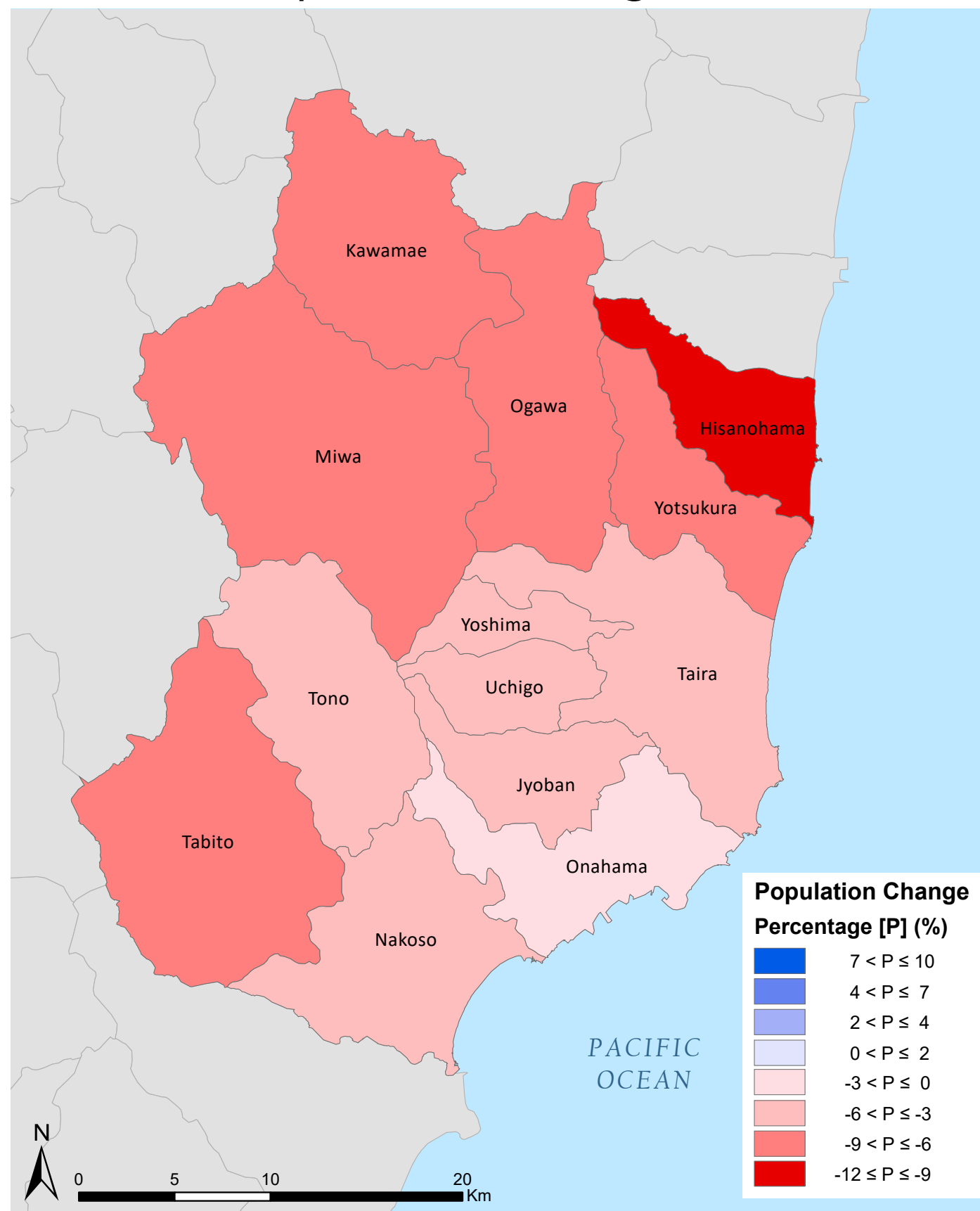
- The port, infrastructure, and boats were destroyed.



- Ports have been recovered, however, normal people cannot get into the area.

POPULTAION CHANGE

Percent Population Change, 2010-2013



Iwaki is divided into 13 districts. Taira, Onahama, Uchigo are urban areas.

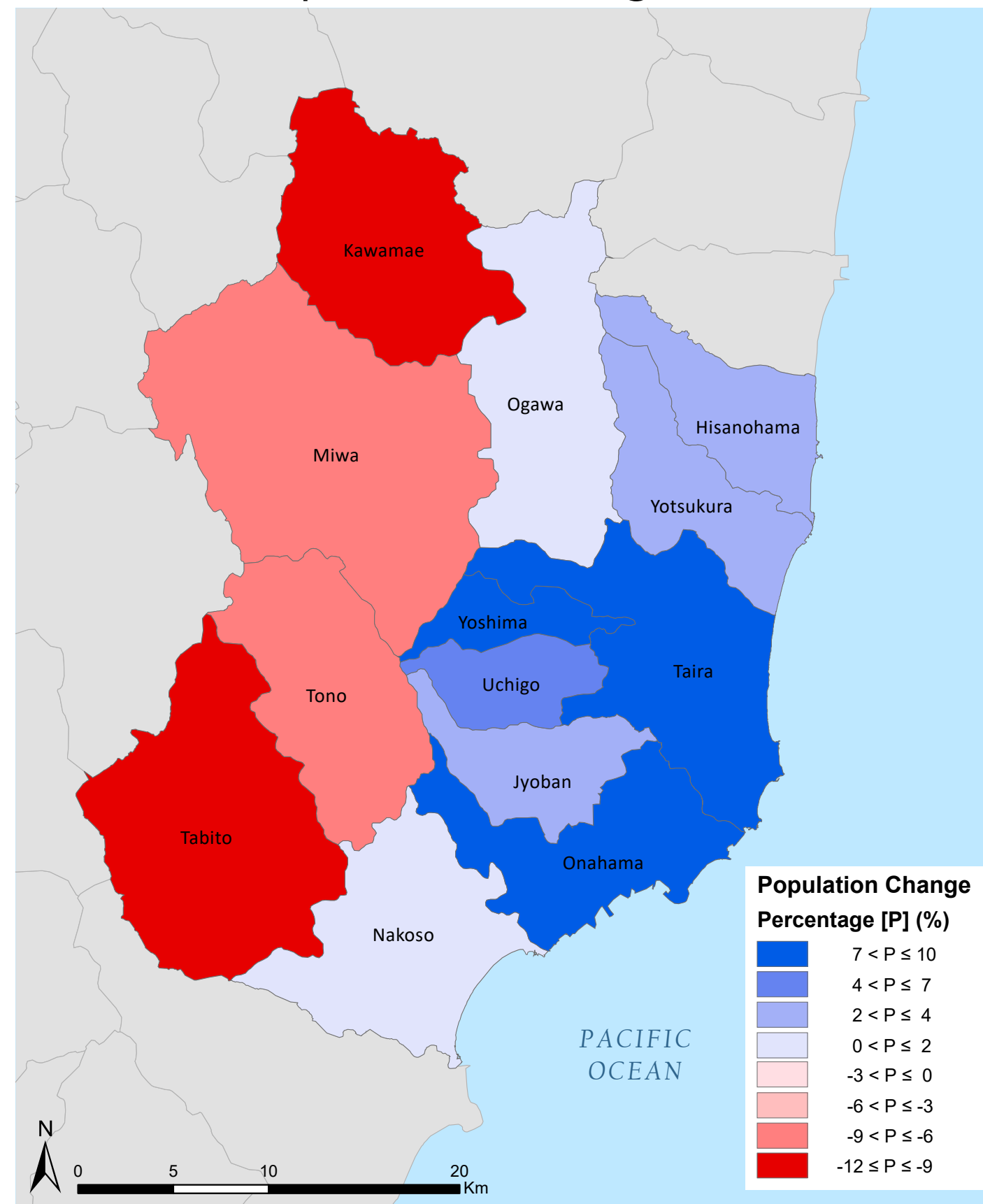
Why Hisanohama has a higher declining rate?

- It is located 30 km from the FINPP.
- Residential Area was wiped out by tsunami & fire.

Why the population is declining even when Iwaki accepted evacuees from other towns?

- Evacuees from outside kept their old addresses.
- Many Iwaki citizens chose to evacuate by themselves.

Percent Population Change, 2013-2016



Why the population increased in urban areas from 2013-16?

- Some of Iwaki citizens returned.

- The FINPP workers commute from Iwaki.

- Many evacuees changed their addresses and became Iwaki citizens.

(*Kawamae, Miwa, Tono, and Tabito are naturally decreasing.)

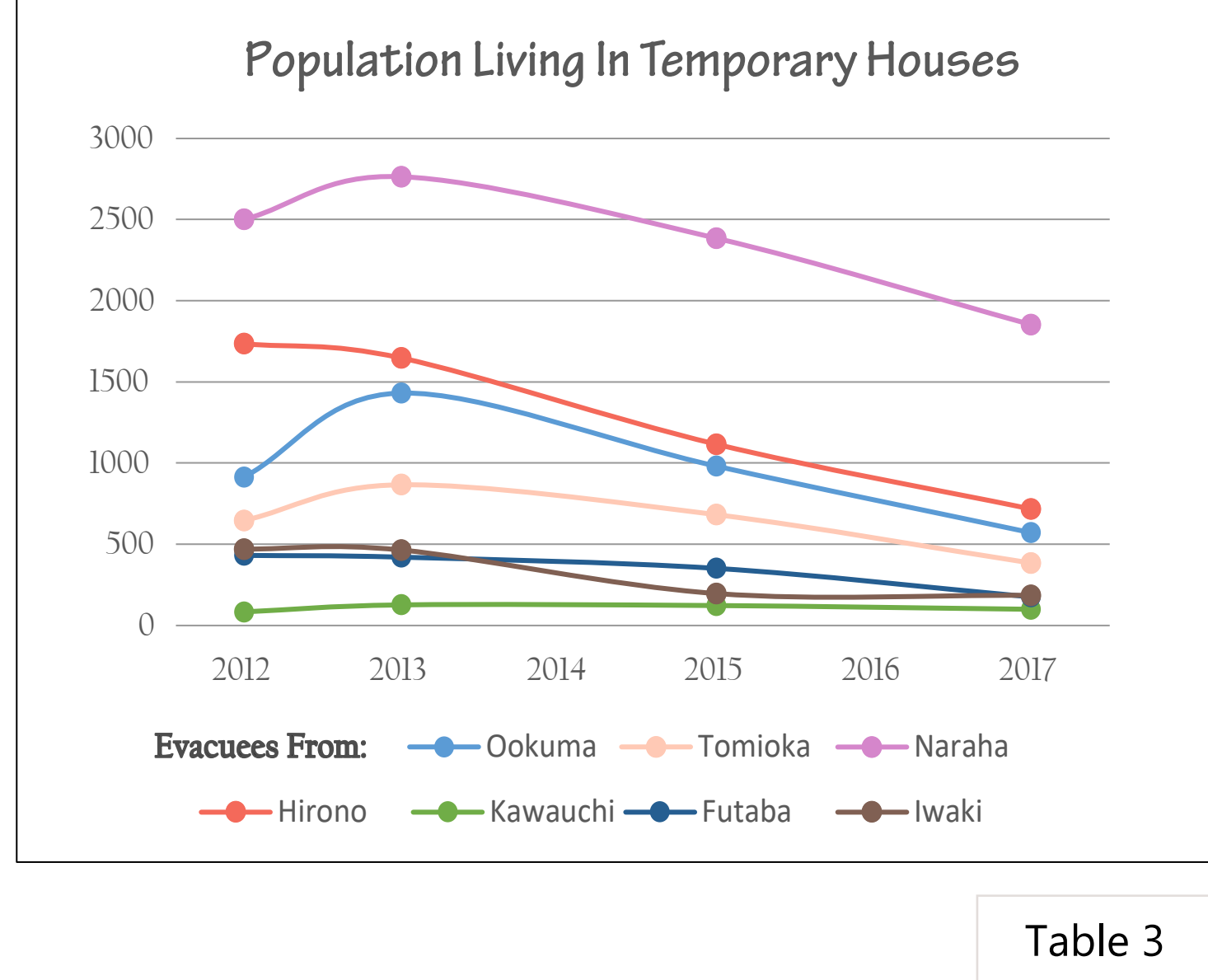


Table 3

- Hirono, Naraha, Kawachi, and Tomioka (Map 2) were eliminated from the “difficult-to-return zone”.

- 2464 people changed their addresses to Iwaki from the areas listed in the graph.

- Iwaki citizens living in temporary houses are mainly the population who lost their houses by tsunami.

It seems like the recovery of the “difficult-to-return zone” is happening (Table 3), but considering the fact that the population in Iwaki is increasing, we can tell that a lot of people settled down in Iwaki City.

RECOVERY GOES ON...

The Facts...

- Radiation rumor still exists in the world.

- Around 10,000 people have lived in the temporary houses for 6 years.

- The radiation is low (0.1 μSv/h or lower).

- All foods produced locally go through a radiation check before distributed in the grocery store.

- Construction of disaster recovery public housings are behind the schedule.

- Many people living in temporary houses have mental and physical health problems.

- It will take another 2-3 years to move people out from temporary houses.

REFERENCE AND CREDITS

Photo Credit: Iwaki City and...

1. Hiroko Ishikawa, Fukushima Prefecture EMAC
2. Ken Midorikawa, Dai Suzuki
3. JGSDF 8th Infantry Regiment, Takayuki Saito, Board of Education
4. Koichi Hosokawa, Fukushima Prefecture EMAC
5. Iwaki Construction Office
6. Tokuji Watanabe

Special Thanks: Kyohei Tano - Iwaki City, Masakazu Nakamura

CONTACT INFORMATION

