

# 2011 Northeast Region/Pacific Coast Earthquake Damage Report

21 MAR 0730

Japan Defense Intelligence  
Headquarters

# 2011 Northeast/Pacific Earthquake

21 MAR 2011 (Mon) 0600  
JDIH

## Earthquake Overview

- ◆ 11 MAR 1446, M9.0 Earthquake occurred off the coast of Sanriku Region, Intensity 7 (Japanese scale, Northern Miyagi)
- ◆ Aftershocks: off the coast of Iwate and Ibaraki (19 MAR 1856, Earthquake with Intensity 5+ at Northern Ibaraki)
- ◆ The GEONET marker in Ojika, Ibaraki has shifted 5.3m ESE and sunk 1.2m (Geospatial Information Authority, Japan)

## Damage overview (20 MAR 2300) ] ( $\pm$ compared to 20 MAR 1400)

- ◆ Deaths: **8,450 (+750)**
- ◆ Missing: **12,909 (+1,258)**
- ◆ Injured: **2,701 (+89)**
- ◆ Displaced : **App. 320,900 (-10,700)**  
Miyagi (**App. 142,400**)  
Fukushima (**App. 111,300**)  
Iwate (**App. 47,400**) etc.
- ◆ Isolated : App. 4,700 ( $\pm 0$ )
- ◆ Rescued : **26,650 (+19)** (MOD Rescued: 19,304)
- ◆ Structure Damage: **127,065 bldgs (+9,791)**

## Damage to Lifeline (20 MAR 2000)

- ◆ Electricity: **Outage at 243,000 homes (-9,000)** (Iwate: **41,000**, Miyagi: **164,000**, Fukushima: 38,000)  
Tokyo Electric Power conducting planned outages from 14 MAR due to insufficient power supply; Tohoku Electric will not have an outage until the **27<sup>th</sup>**.
- ◆ Water: Outage: **720,000 (-20,000)**
- ◆ Gas: Outage: **415,000 (+1,000)**

## Damage to Infrastructure (20 MAR 0000)

- ◆ Roads: **1,446** damaged areas; 48 damaged bridges; 17 Expressway (Kanetsu, Joushinetsu, Chuo is open for civilian vehicles) and **28** highways blocked
- ◆ Rail: Operations of some JR lines in Tohoku region resumed.  
Restricted Rail transportation in Tohoku due to planned power outages. Reduced lines for the Tokyo railway.
- ◆ Air: All airports operational
- ◆ Ports: Hachinohe, Miyako, Kuji, Kamaishi, Sendai Shiogama, and Souma ports are partially operational

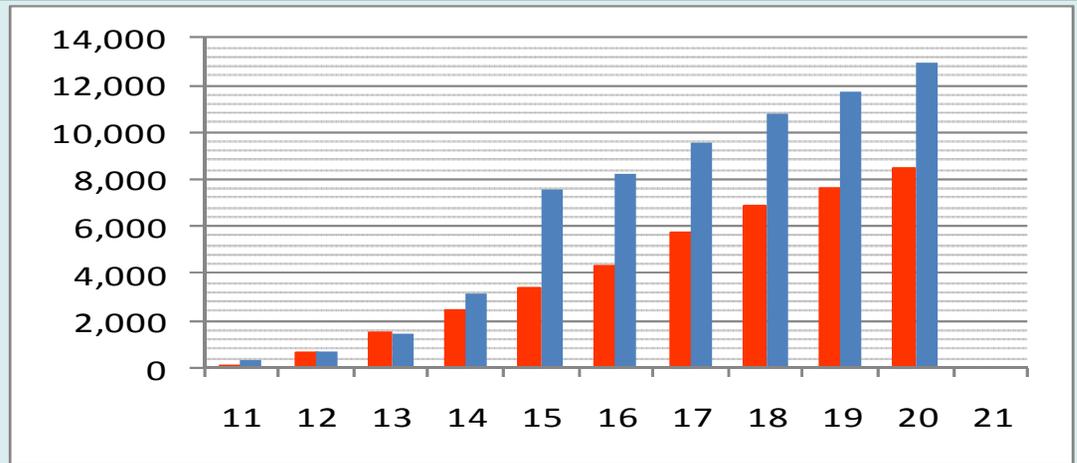
- ◆ Fukushima Daiichi Nuclear Power Plant  
11 MAR 1922 Nuclear Emergency Declared  
15 MAR 1100 Residents 20-30km radius ordered to stay indoors  
17-MAR JSDF/NPA starts reactor water spraying operations with hose/HELO  
18 MAR INES provisional assessment level 5  
19 MAR 1405 Fire Dept hoses reactor 3 until 20 MAR 0340  
20 MAR 0800 temp of reactor 3 rises  
20 MAR 0820-0938 JSDF hoses reactor 4  
**20 MAR 1822-1943 JSDF hoses reactor 4**  
**20 MAR 2130-0358 Fire Dept hoses reactor 3**  
**21 MAR 0637- JSDF hoses reactor 4**
- ◆ Fukushima Daini Nuclear Power Plant  
12 MAR 0522 Nuclear Emergency Declared  
12 MAR 0745 Evacuation order 10km radius

# Human Loss ①

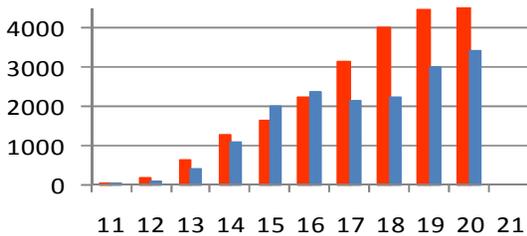
Totals (Includes Kanto)	
Deaths	8,450(+750)
Missing	12,909(+1,258)
Injured	2,701 (+89)
Damage to Structures	127,065 (+9,791)

■ Deaths  
■ Missing

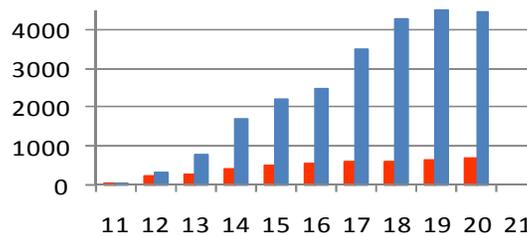
(Numbers in ( ) show difference from 20 MAR 1400)



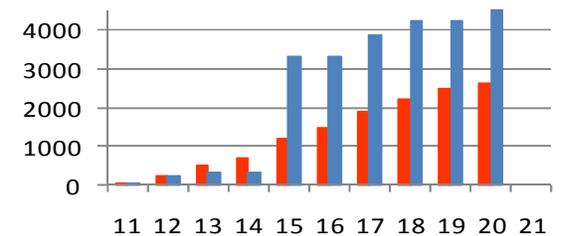
Miyagi	
Deaths	5,053 (+604)
Missing	3,413 (+428)
Injured	988 (+80)
Damage to Structures	4,479 (+1,765)



Fukushima	
Deaths	691 (+44)
Missing	4,468 (+60)
Injured	220 (±0)
Damage to Structures	10,981(±0)



Iwate	
Deaths	2,650 (+125)
Missing	5,023 (+770)
Injured	143 (±0)
Damage to Structures	11,158 (+112)



# Human Loss ②

## Totals

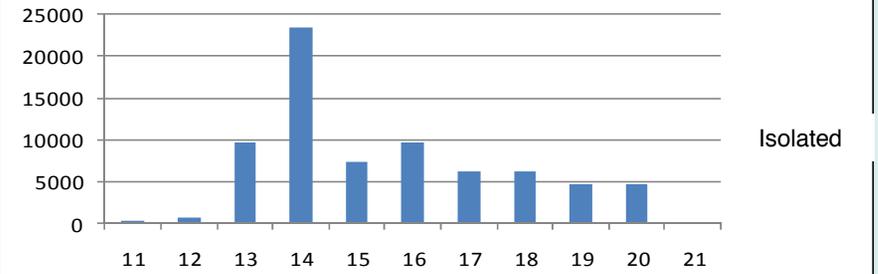
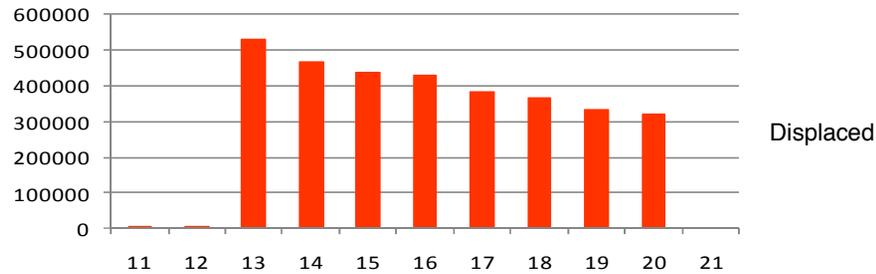
※ Not counting those displaced by the nuclear power plant: App. 20,400

**Displaced**

**App. 320,900(-10,700)**

**Isolated**

**App. 4,700 (±0)**



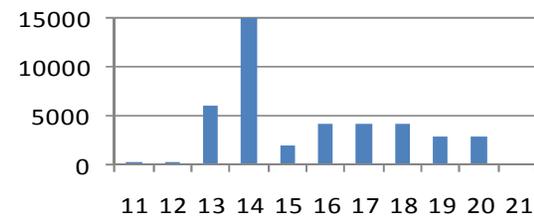
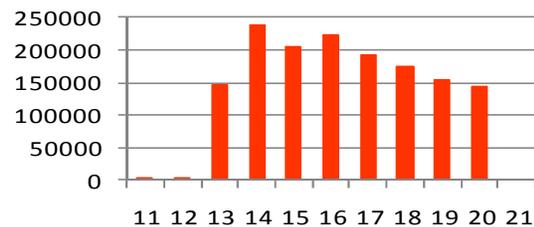
### Miyagi

**Displaced**

**App 142,400 (-12,400)**

**Isolated**

**App 2,800 (±0)**



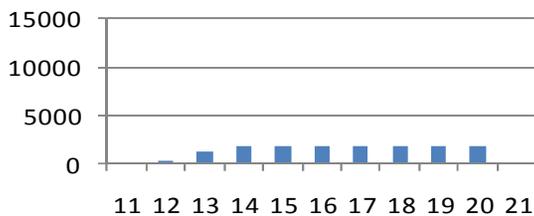
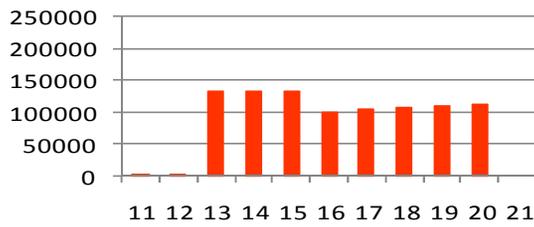
### Fukushima

**Displaced**

**App 111,300 (+1,900)**

**Isolated**

**App 1,900 (±0)**



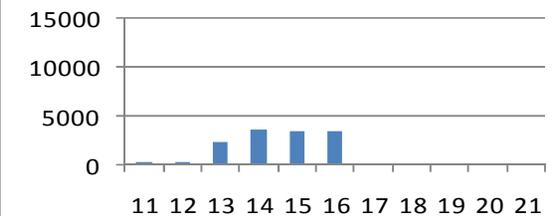
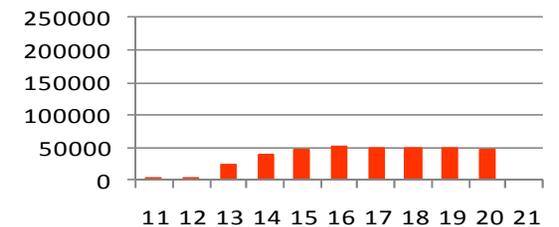
### Iwate

**Displaced**

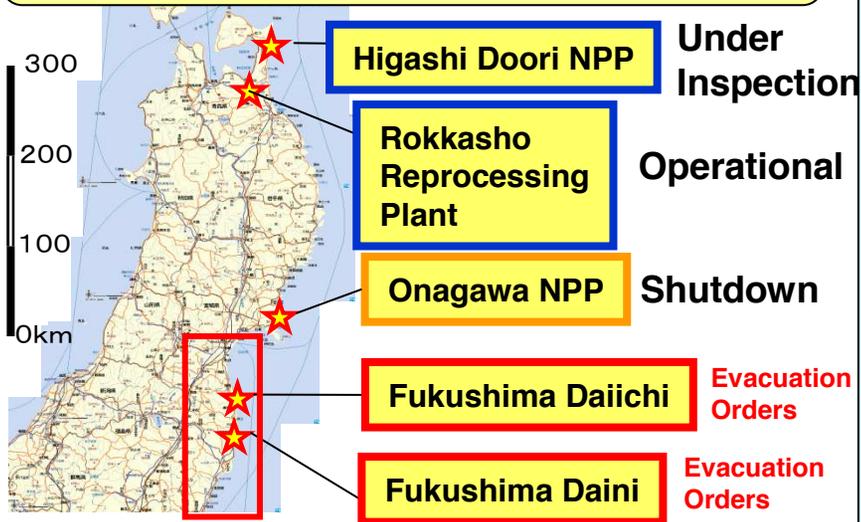
**App 47,400 (-2,100)**

**Isolated**

**0**



# Nuclear Power Plants



## Fukushima Daiichi Nuclear Power Plant

- ◆ 11 MAR 1922 Nuclear Emergency Declared
- ◆ 12 MAR 1825 Evacuation Order 20km radius
- ◆ 15 MAR 1100 Residents 20-30km radius ordered to stay indoors (by Prime Minister Kan)
- ◆ 15 MAR 1410 30km radius no-fly zone declared (MLIT)
- ◆ 17-18 MAR JSDF/NPA conduct reactor 3 cooling missions: Water Cannons/HELOs
- ◆ 18 MAR Power Restoration Effort Continues (reactor 1, 2, 5, 6)
- ◆ 18 MAR INES provisional assessment of situation released
  - ◇ Reactor No. 1, 2, 3: Evaluation Level 5 (Accident with Widespread Consequences)
  - ◇ Reactor No. 4: Evaluation Level 3 (Serious Incident)
- ◆ 19 MAR Fire Dept Water Cannon vehicles hosed reactor 3
- ◆ 19 MAR Cooling systems restored to Reactors 5 and 6. Reduced water temperature in the spent fuel pool.
- ◆ 20 MAR 0820-0938: 11 FD trucks from JSDF, etc. will hose reactor 4 (approximately 80t)
- ◆ 20 MAR 1822-1943: 11 Fire Trucks from JSDF and others will conduct hosing operations on reactor 4
- ◆ 20 MAR 2130- FD will conduct hosing operations to reactor 3
- ◆ 21 MAR 0637- JSDF will conduct hosing ops to reactor 4

## Fukushima Daini Nuclear Power Plant: Cooling suspended

- ◇ 12 MAR 0745 Evacuation Order 10km radius
- ◇ Radioactive Materials Released?: No
- ◇ Displaced Persons: 32,426 (10km radius)

Source: Emergency Disaster Relief Headquarters

# Detailed Report of the Fukushima Nuclear Powerplant

Source: Nuclear Powerplant Disaster Response Headquarters

	Reactor 1	Reactor 2	Reactor 3	Reactor 4	Reactor 5 & 6
	Auto Shutdown			Shutdown (Inspection)	Shutdown (Inspection)
	INES Level 5			Level 3	
Major Incidents	11 MAR 1636 Cooling System Failure 12 MAR 0049 Containment Structure Pressure Rises 12 MAR 1536 Hydrogen Explosion	11 MAR 1636 Cooling System Failure 12 MAR 2250 Containment Pressure Rises 14 MAR 1325 Loss of Cooling Capability 15 MAR 0610 Explosive Sound heard 15 MAR 0642 Suppression Pool Damaged	13 MAR 0856 Cooling System Failure 14 MAR 1101 Hydrogen Explosion 15 MAR 1023 400mSv/h radiation 16 MAR 0837 White Smoke Detected 16 MAR 0647·0847 400mSv/h radiation 20 MAR 0800Temp rise in reactor (over 300°C). → Pressure increased	14 MAR 0408 Temp rise in Spent Fuel Pool (Normally 40°C) 15 MAR 0938 Fire (extinguished 1225) 16 MAR 0545 Fire (extinguished 0726)	15 MAR 1600 Temp rise in Spent Fuel Pool of Reactor 5 and 6 19 MAR 1830 Temperature lowers in the Spent Fuel Pool of both reactors 5 and 6 20 MAR 1921Reactor 6 core temp lowers to a ideal temperature (below 100 °C)
Current Status	<ul style="list-style-type: none"> <li>Roof of the outer structure damaged</li> <li>Water level: A: -1,700mm (-50) B: -1,750mm (as of 20 MAR 1500: Compared to 20 MAR 0500)</li> <li>Reactor Core Damage 70% (15 MAR 1530)</li> </ul>	<ul style="list-style-type: none"> <li>East side of outer structure has a hole. Smoke/steam is can be seen</li> <li>Water Level: -1,400mm(-100) (as of 20 MAR 1500: Compared to 20 MAR 0500)</li> <li>Reactor Core Damage 33% (15 MAR 1530)</li> </ul>	<ul style="list-style-type: none"> <li>Only the reinforced steel remain on roof</li> <li>Upper Containment Structure temp: 128 °C</li> <li>Water Level: A: -1,650mm (+300) B: -2,000mm (+300) (as of 20 MAR 1600: Compared to 20 MAR 0430)</li> <li>Reactor Core Damage 30% (14 MAR 0635)</li> </ul>	<ul style="list-style-type: none"> <li>Only the reinforced steel remain on roof</li> <li>Water temp: 84°C (temp gauge damaged) (as of 14 MAR 0408. Water temp gauge stopped functioning since)</li> </ul>	<ul style="list-style-type: none"> <li>No visible external damage</li> <li>Water Level: Reactor 5: 37.1°C (-3.0) Reactor 6: 41.0°C (-11.0) (20 MAR 0700: Compared to 20 MAR 0300)</li> </ul>

# Detailed Report of the Fukushima Nuclear Powerplant

Source: Nuclear Powerplant Disaster Response Headquarters

	Reactor 1	Reactor 2	Reactor 3	Reactor 4	Reactor 5 & 6
Countermeasures	<p>12 MAR 0907 Vent Reactor 12 MAR 2020 Seawater/Boric Acid Pumped 19 MAR Power estimated to be restored • Completed laying the cable from external power line to the power plant backup transformer. Currently connecting power to motor and other equipment.</p>	<p>14 MAR 1654 Pressure Reduction techniques employed, Seawater Pumped 14 MAR 1806 Vented Reactor 17 MAR, Power Cable Restoration starts • Completed laying the cable from external power line to the power plant backup transformer. Currently connecting power to motor and other equipment. 20 MAR 1505 Water flow starts at spent fuel pool</p>	<p>13 MAR 0907 Vent Reactor 13 MAR 1312 Seawater/Boric Acid Pumped 17, 18 MAR JSDF water spraying operations 19 MAR 0030 FD Hosing Operations 17 MAR Hosing/Water Spray by FD/JSDF 18 MAR 1400-1438 Hose by JSDF 19 MAR 0030 Fire Dept Hosing Ops 20 MAR 2130- Fire Dept Hosing Ops</p>	<p>19 MAR Power restoration effort continues 20 MAR 0820-0943 JSDF/TEPCO Hose Ops 20 MAR 1822-1943 Hose Ops (JSDF/TEPCO)</p>	<p>17 MAR Power restoration efforts continue 18 MAR Release Hydrogen from ceiling 19 MAR 0500 Reactor 5 pump activated 19 MAR 0742 Generator activated for reactor 5/6 19 MAR 2214 Reactor 6 pump activated • Installing a seawater pump to the reactor 5 spent fuel pool. → Temperature Decline</p>
Today's Schedule	<p>• Final Inspection before starting up equipment</p>		<p>• 0800-1600: Power Restoration Ops Continue</p>	<p>• 0600-0700 JSDF/TEPCO Hosing Operations • 0800-1600 Power Restoration Ops Continue</p>	<p>• Power Restoration Ops Continue (Expected to be Complete today)</p>

# Lifeline Status

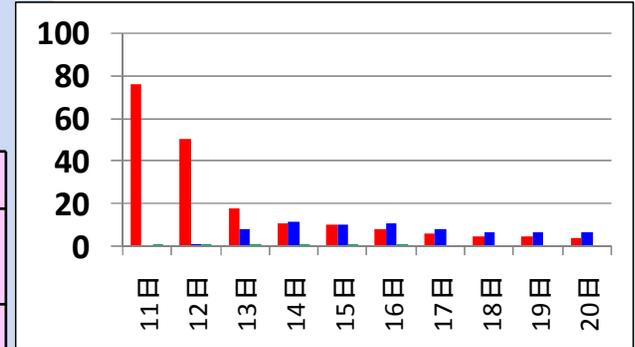
#s in ( ) show difference from 20 MAR 1400

## Estimate of Restoration

- ◇ Respective local government and business entities are surveying the area and preparing estimates
- ◇ Reference:  
Hanshin-Awaji Great Earthquake Lifeline Restoration  
Electricity: 7 days  
Phone Services: app. 2 weeks  
Gas, Sewage: app. 3 months

(Source: Hyogo Prefecture Archives)

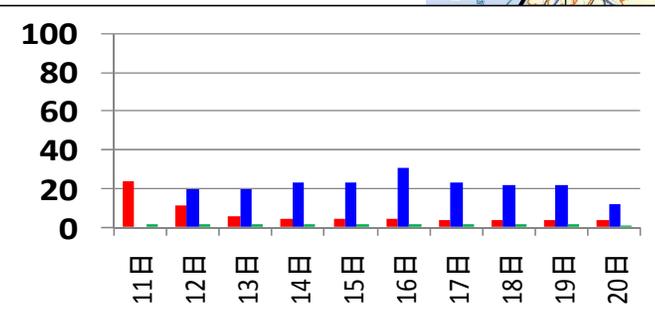
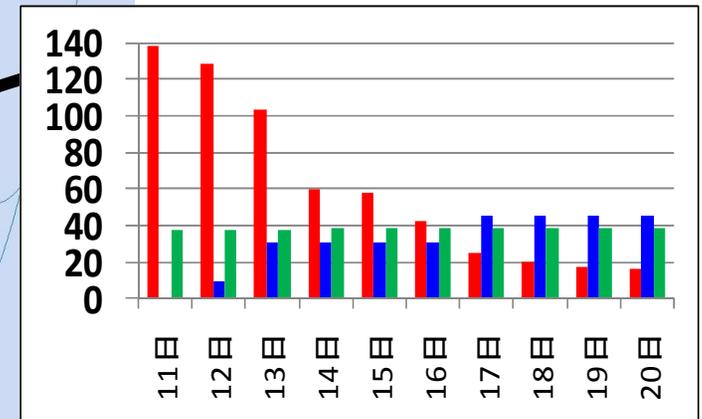
Iwate	
Electricity	Outage: 41,000 homes (-2,000)
Water	Outage: 60,000 homes (-10,000)
Gas	Outage: 7,000 homes (±0)



Legend	
■ (Red)	: Power Outage
■ (Blue)	: Water Outage
■ (Green)	: Gas Outage

Miyagi	
Electricity	Outage: 164,000 homes (-6,000)
Water	Outage: 460,000 homes (+10,000)
Gas	Outage: 389,000 homes

Fukushima	
Electricity	Outage: 38,000 homes (±0)
Water	Outage: 200,000 homes (-2,000)
Gas	Outage: 19,000 homes (±0)



## Communications

- ◇ Phone line: Mostly Restored
- ◇ Cell Phone: Mostly Restored

Source: METI, MLHW, TEPCO, Gas Assoc. 7

# MSR (1)

Tohoku Expressway

Akita Expressway

Yamagata Expressway

Banetsu Expressway

Tohoku Expressway

## Legend

● : Major City

— : Accessible

— : Emergency Vehicles Only

— : Unusable

Hachinohe Expressway

All MSR's Accessible by JGSDF DR Vehicles

Fukushima Daiichi Powerplant

Fukushima Daini Powerplant

Joban Expressway (accessible from Hirono to Tomioka)



Source: Emergency Disaster Relief Headquarters, Japan Highway Organization

# Access to Major Cities from Route 4

**Legend**

- : Major City
- : Accessible
- : Emergency Vehicles Only
- ✈ : Airports

Aomori APT

Misawa APT

Odate-Noshiro APT

Akita APT

Hanamaki APT

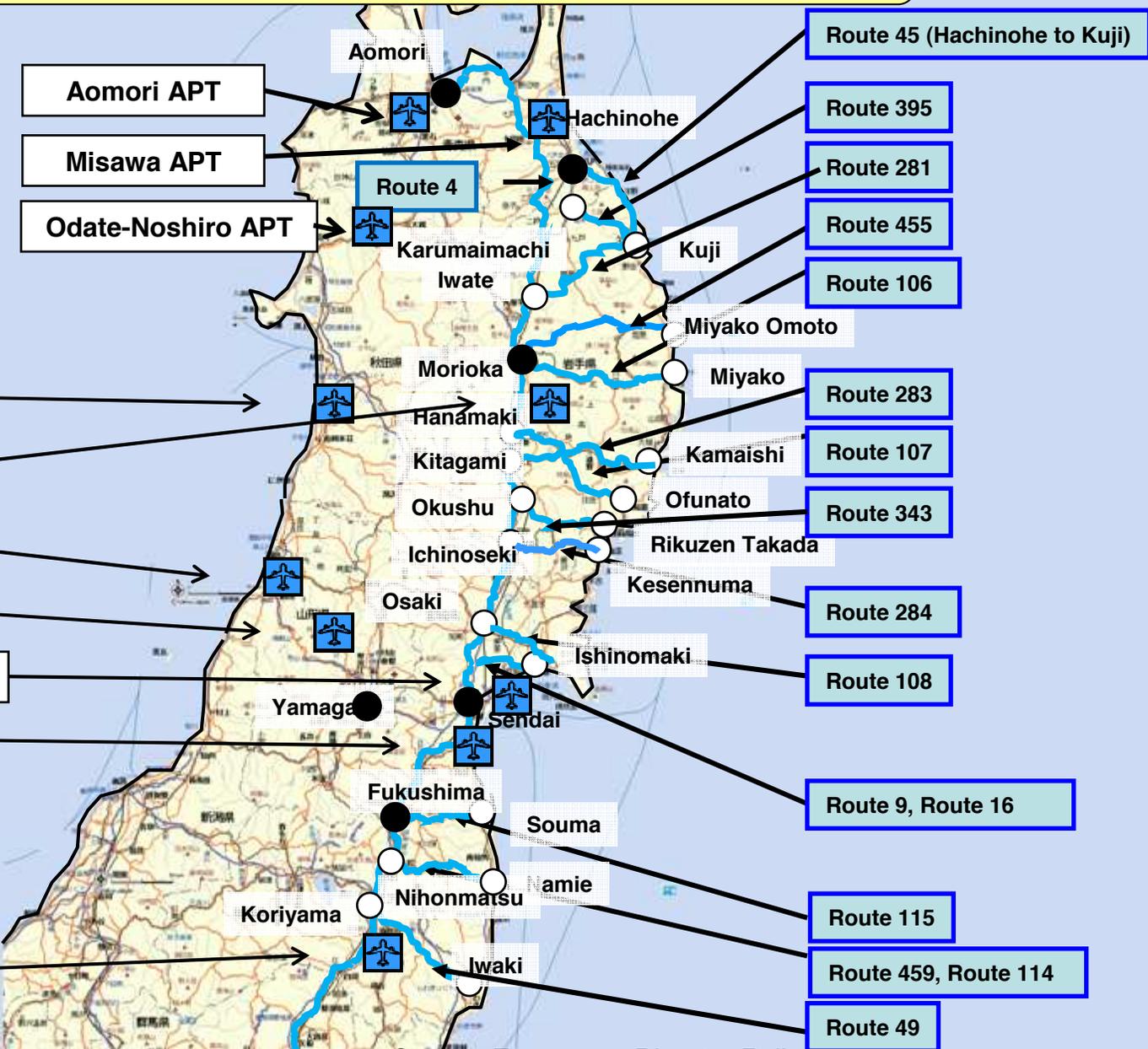
Shounai APT

Yamagata APT

Matsushima Base

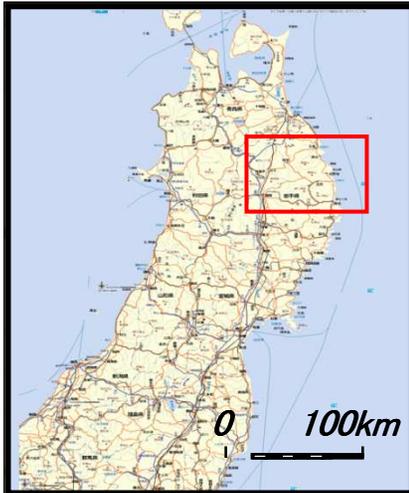
Sendai APT

Fukushima APT



Source: Emergency Disaster Relief Headquarters, Japan Highway Organization

# Northern Iwate

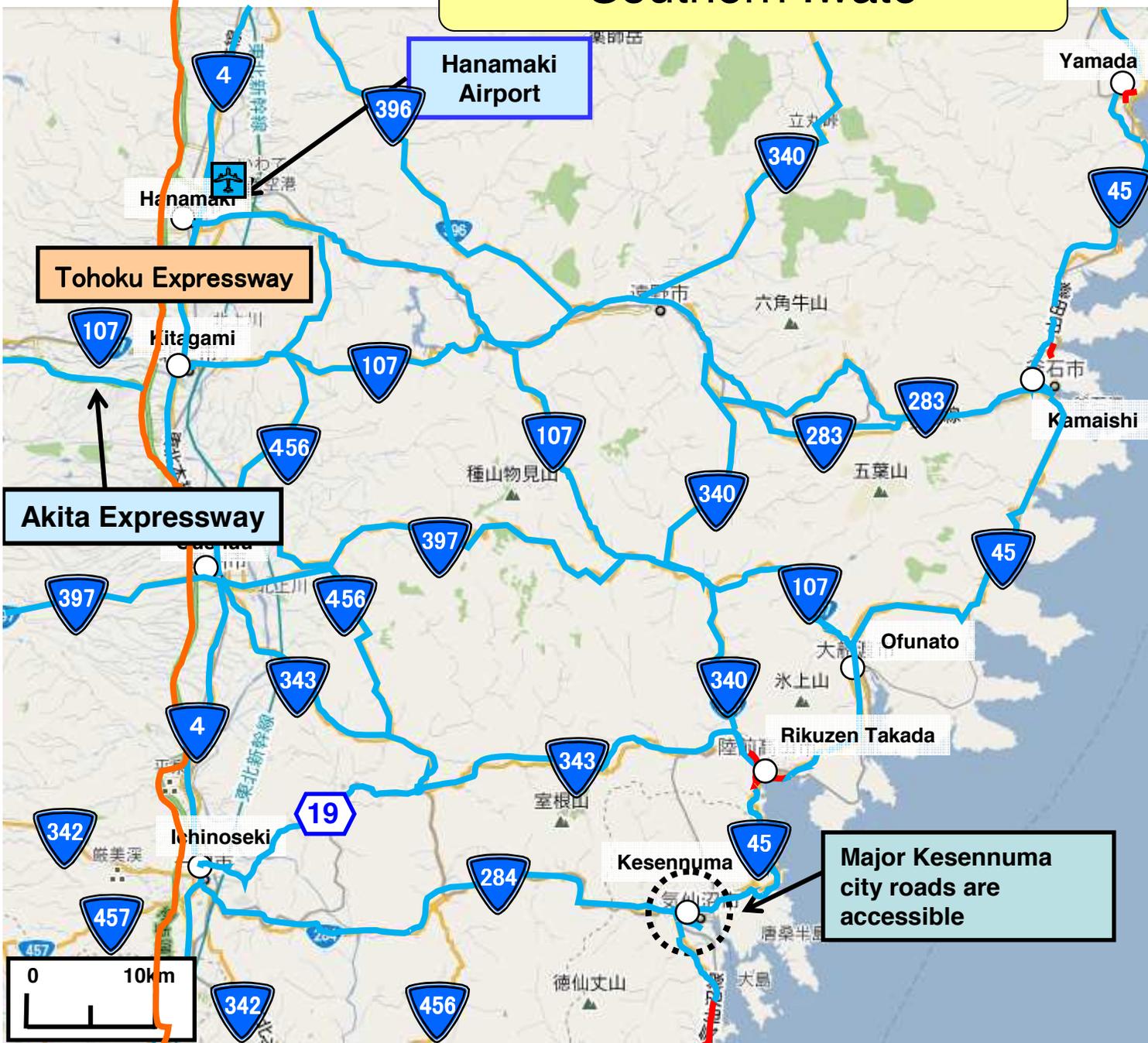


**Legend**

- : Major City
- : Other City
- (Blue line) : Accessible
- (Orange line) : Emergency Vehicles Only
- (Red line) : Not Accessible
- (Black line) : Inspecting
- (Blue circle) : FWD SPT Base
- ▲ (Blue triangle) : Natl Highway

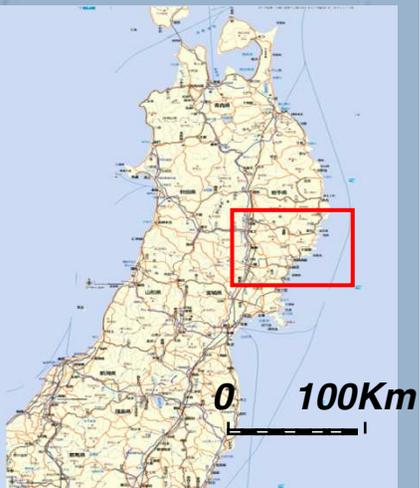


# Southern Iwate



**Legend**

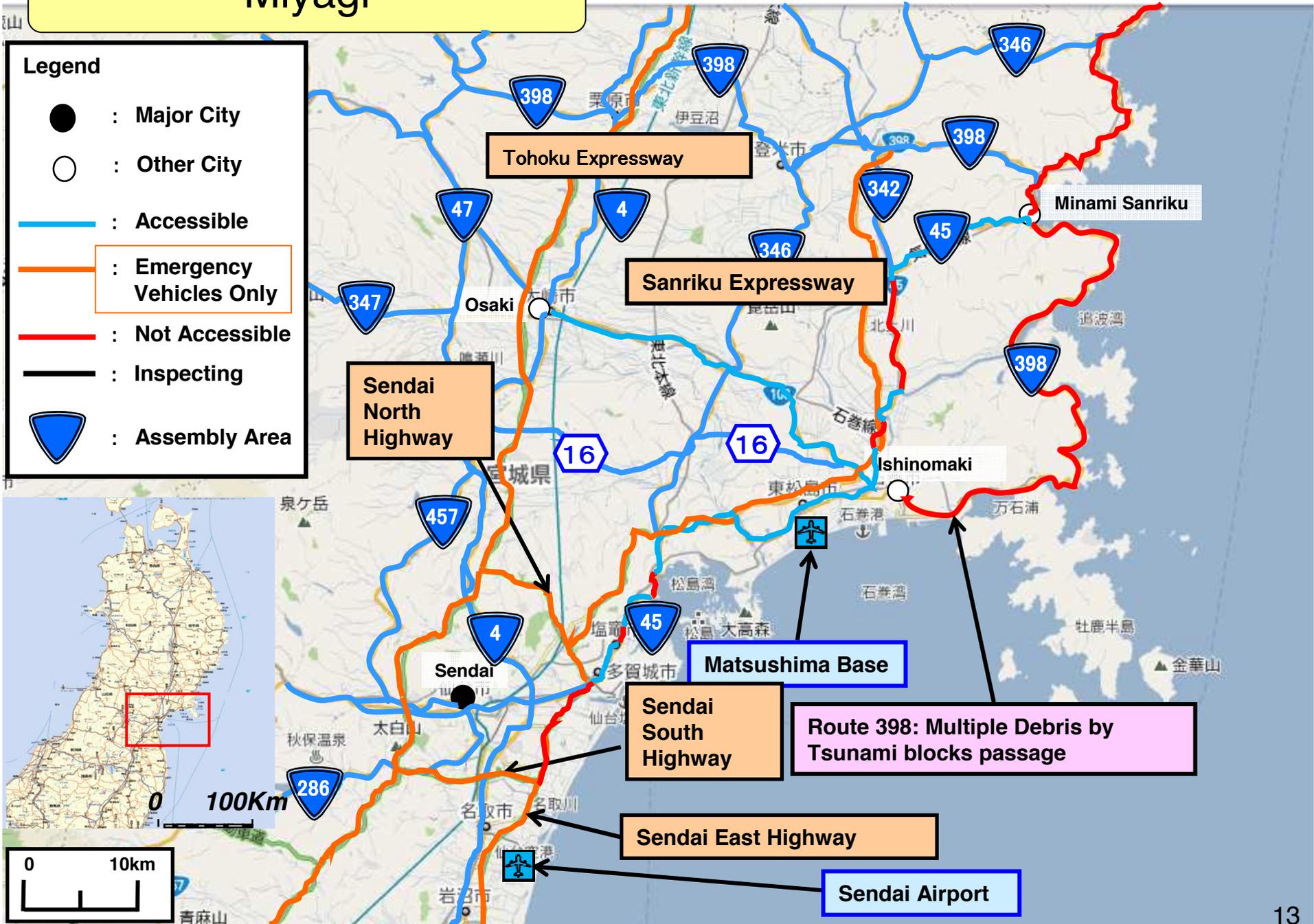
- : Major City
- : Other City
- (Blue) : Accessible
- (Orange) : Emergency Vehicles Only
- (Red) : Not Accessible
- (Black) : Inspecting
- (Blue) : Assembly Area
- ▲ (Blue) : National Highway
- ◡ (Blue) : Prefecture Road



# Miyagi

## Legend

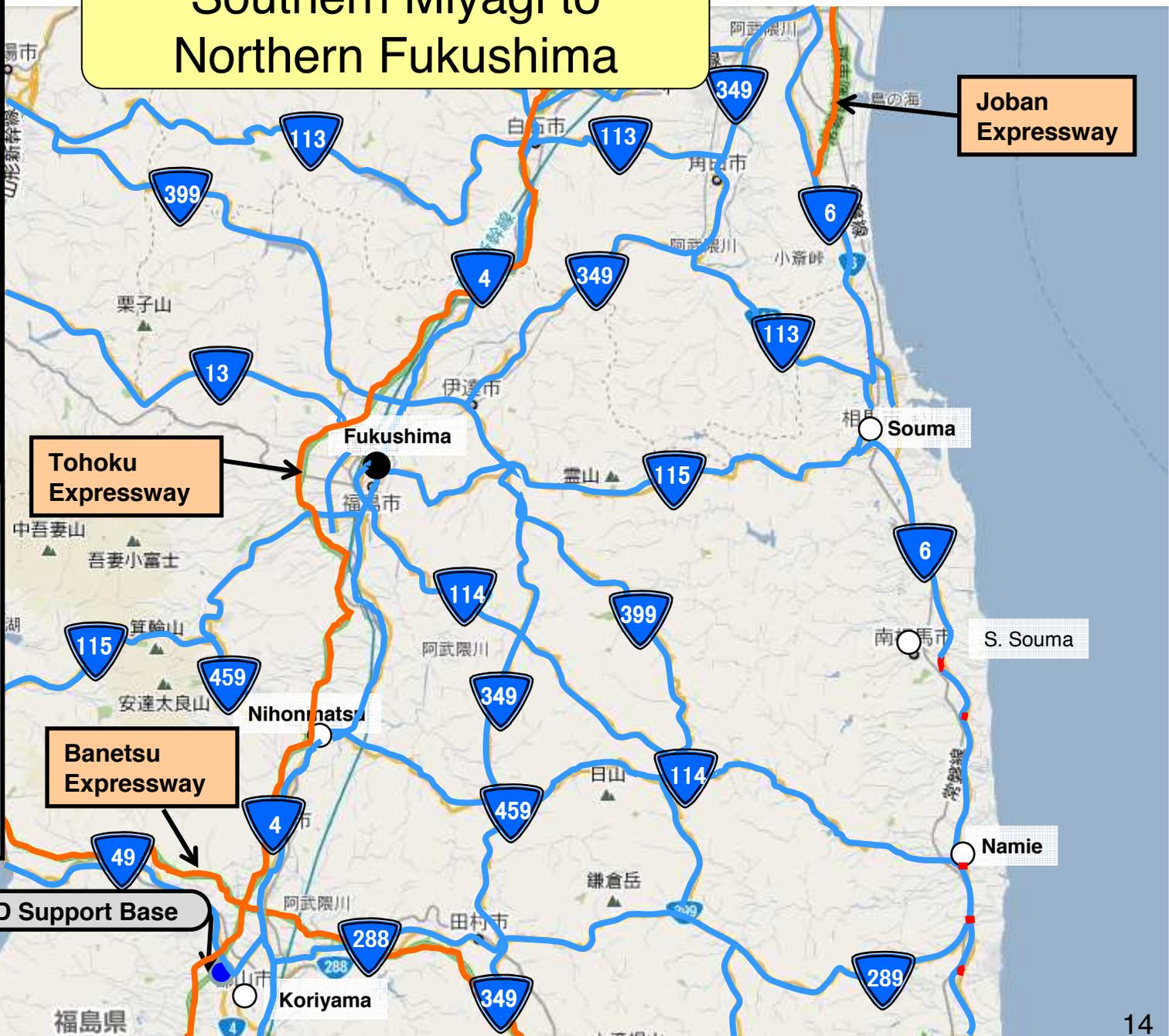
- : Major City
- : Other City
- (Blue) : Accessible
- (Orange) : Emergency Vehicles Only
- (Red) : Not Accessible
- (Black) : Inspecting
- ▲ (Blue) : Assembly Area



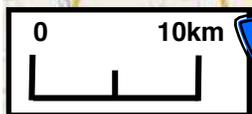
# Southern Miyagi to Northern Fukushima

**<Legend>**

- Major City
- Other City
- Accessible
- : Emergency Vehicles Only
- Not Accessible
- Being Confirmed
- FWD SPT Base
- ▲ National Roads



Camp Koriyama: FWD Support Base



Joban Expressway

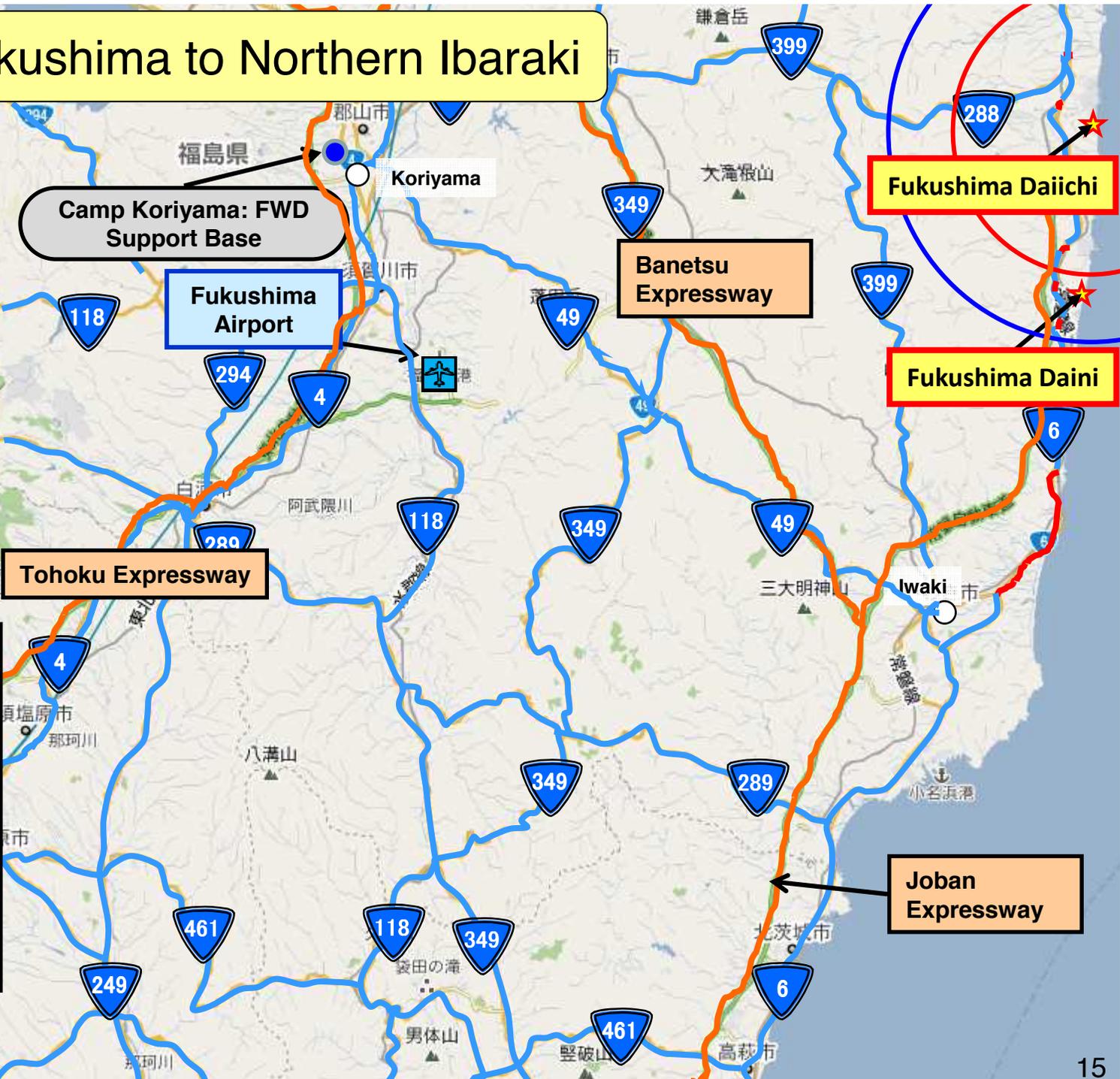
Tohoku Expressway

Banetsu Expressway

# Southern Fukushima to Northern Ibaraki

<Legend>

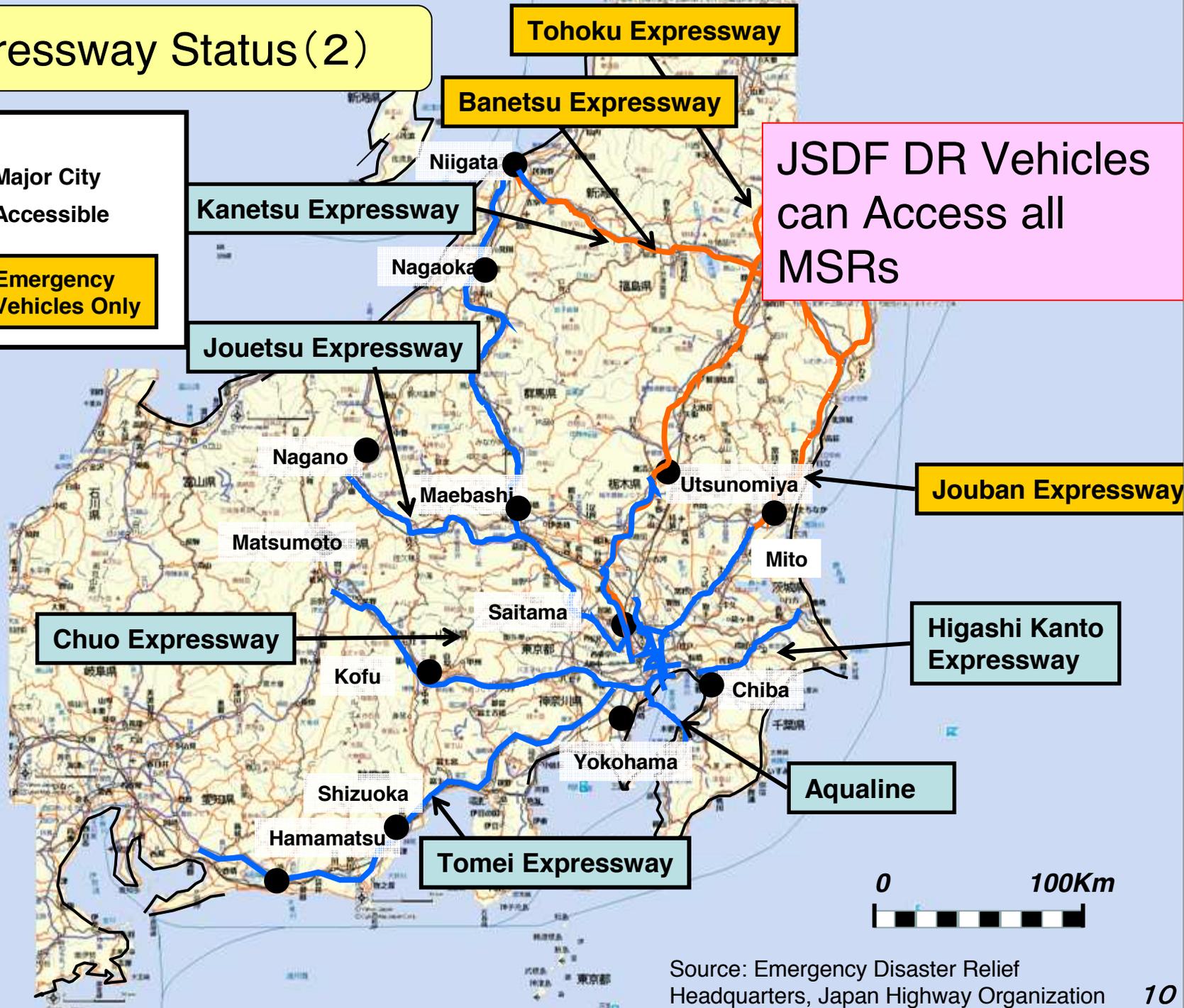
- Major City
- Other City
- Accessible
  - Emergency Vehicles only
  - Not Accessible
- Being Confirmed
- FWD SPT Base
- ▲ National Roads



# Expressway Status (2)

**Legend**

- : Major City
- (Blue) : Accessible
- (Black) : Emergency Vehicles Only

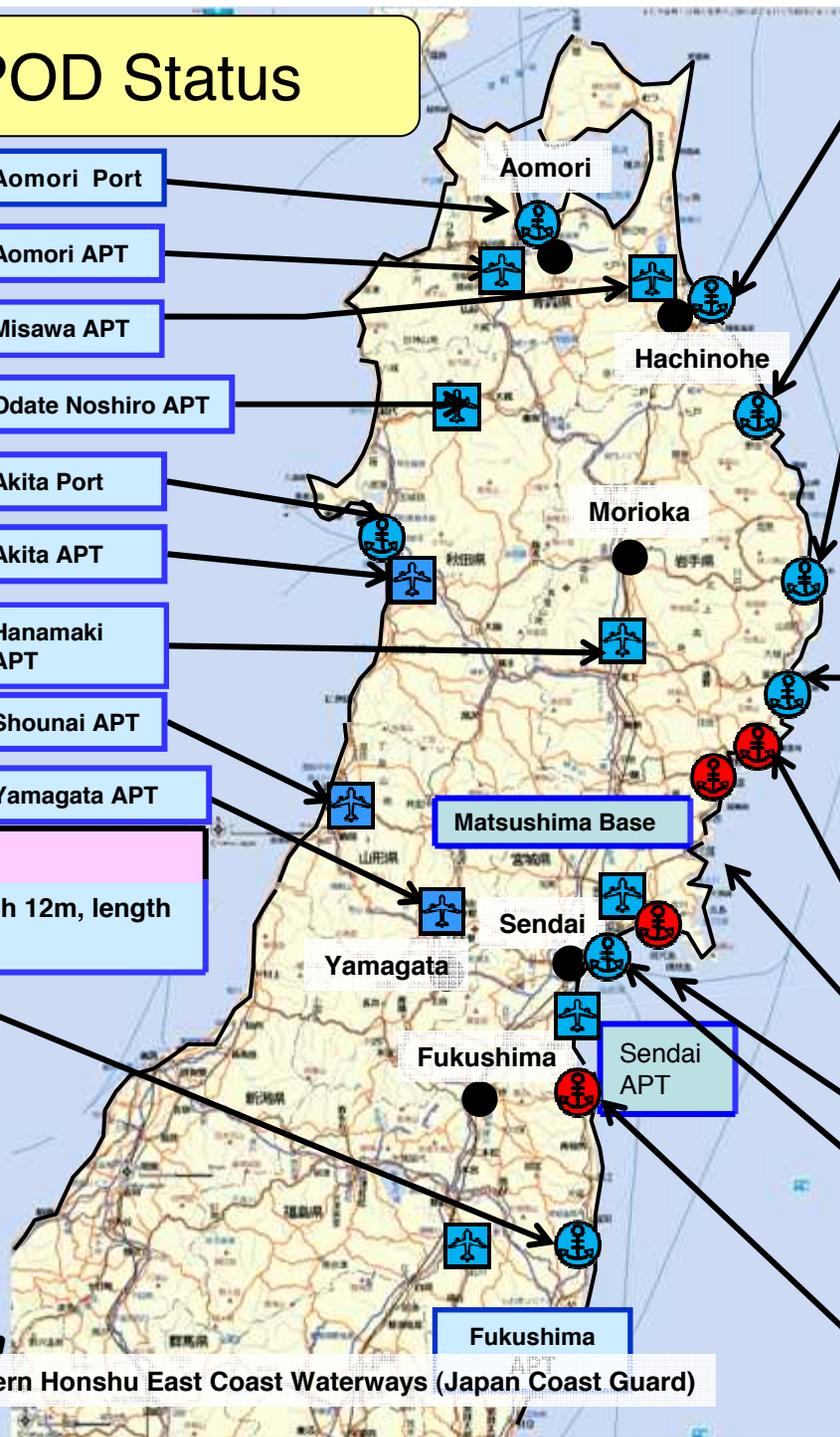


# APOD/SPOD Status

**Legend**

- : Major City
- ✈ : Major Airport
- ⚓ : Major Seaport
- : Operational
- : Unusable

- Aomori Port
- Aomori APT
- Misawa APT
- Odate Noshiro APT
- Akita Port
- Akita APT
- Hanamaki APT
- Shounai APT
- Yamagata APT



- Hachinohe Port: Damage to Quay/Breakwater**  
Partial Use: Hachitaro Berth D (depth 10m, length 270m) and Berth 16 among others
- Kuji Port: Quay Collapse, Liquefied**  
Partial Use: Suwashita Pier 1 (Length: 140m of the 185m useable)
- Miyako Port (High Priority Port):**  
- Quay Collapse, Multiple Debris  
- JMSDF increased effort (4-10 ships)  
- Breakwater collapse  
Partial Use: Fujiwara Pier 1 (Depth 12m, length 240m) and berth 4
- Kamaishi Port (High Priority Port):**  
JMSDF clearing port  
Partial Use: Suga Pier Berth 1 (Depth 11m Length 190m)
- Ofunato Port: Clearing Port since the 19<sup>th</sup>**  
Partial Use: Nonoda Pier is clear but waterway leading to port is still closed
- Kesenuma Port: Port Survey Complete. Clearing Operations ongoing (19<sup>th</sup> 1730)**
- Ishinomaki Port: Nakajima pier being cleared/surveyed**
- Sendai Shiogama Port (High Priority Port):**  
Partial Use: Nakano Takamatsu Pier (depth 12m, length 240m) and berth 7
- Souma Port: JMSDF is clearing port**  
Partial Use of pier 2 (depth 12m, length 240m)

**Onabama Port:**  
Partial Use: Fujiwara Pier (depth 12m, length 240m) and berth 2

Matsushima Base

Yamagata

Fukushima

Fukushima

0 100Km

(Reference: Southern Honshu East Coast Waterways (Japan Coast Guard))