

# Changes in Land Use Following Natural Disasters and the Role of Protected Areas

1<sup>ST</sup> ASIA PARKS CONGRESS  
November 13-17, 2013  
Sendai International Center

Graduate School of Life and  
Environmental Sciences,  
University of Tsukuba



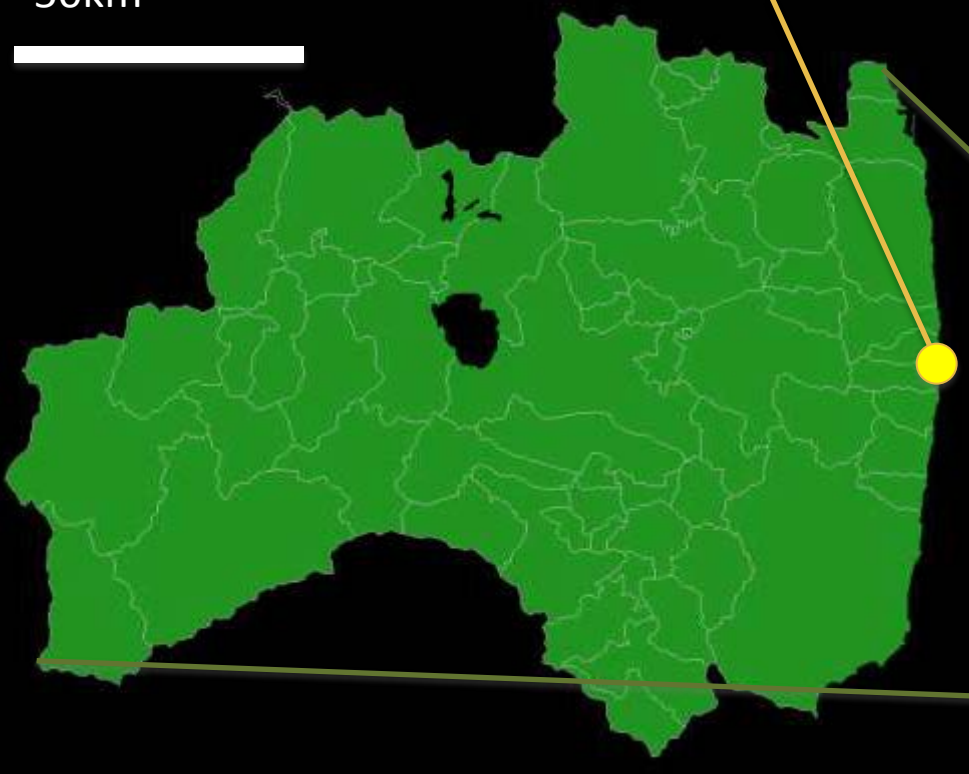
Akihiro Nakamura  
Taiichi Ito  
Atsushi Kawabata

# Background - 1

After the East Japan Great Earthquake Disaster (March 11, 2011) and the Fukushima Daiichi Nuclear Disaster, a deliberate evacuation area was set within 11 municipalities in Fukushima prefecture. This was designed as a means of zoning for risk reduction.

# Fukushima Daiichi Nuclear Disaster

50km



Sendai City

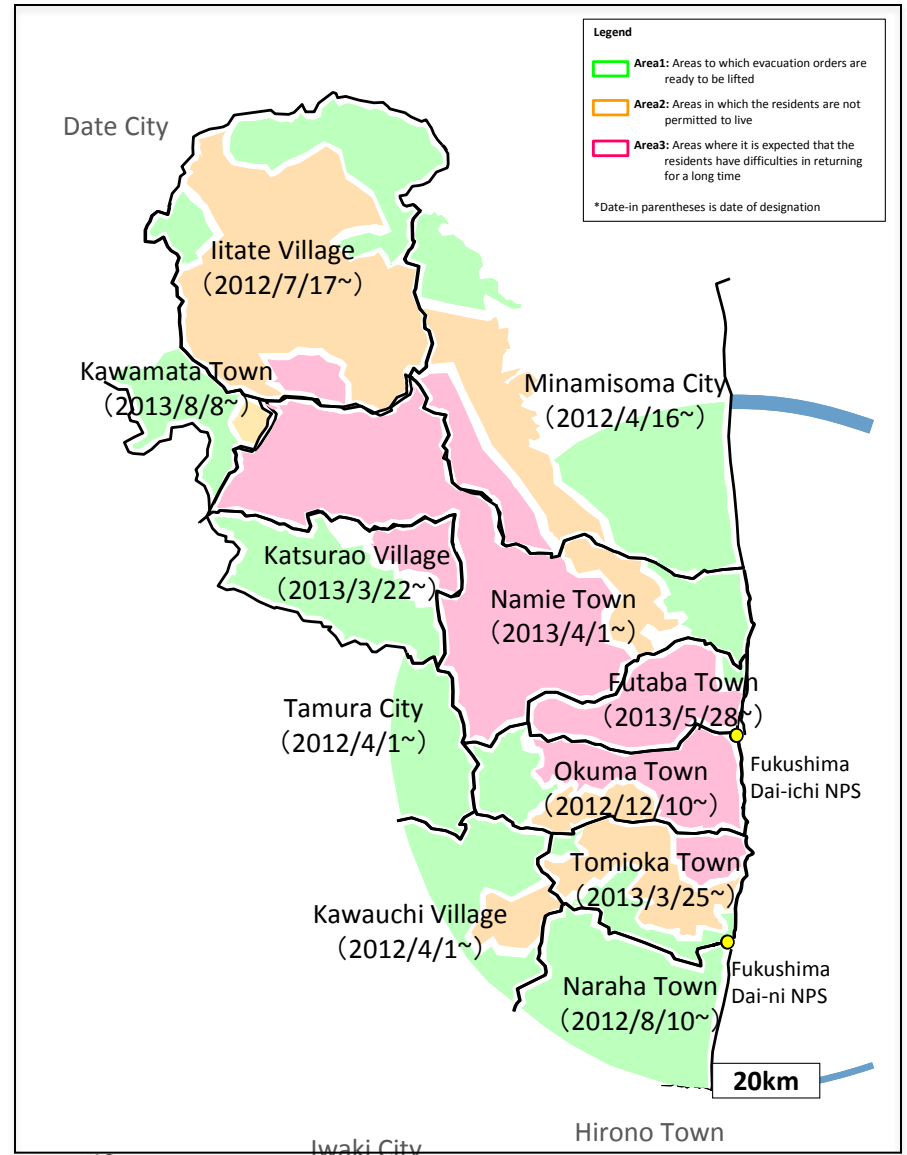
Japan

Soil density map in the evacuation directive area  
 (Deposition amount of Cs-134 and Cs-137 total)  
 March 11, 2013



Source: Nuclear Regulation Authority

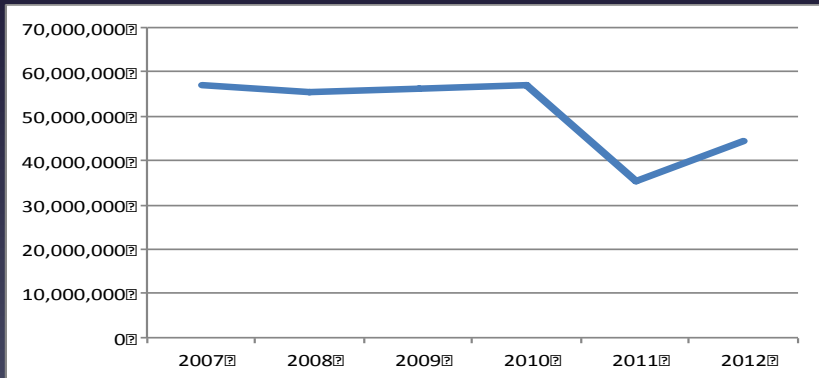
Areas to which evacuation orders have been issued  
 (August 7, 2013)



Source: Ministry of Economy, Trade and Industry

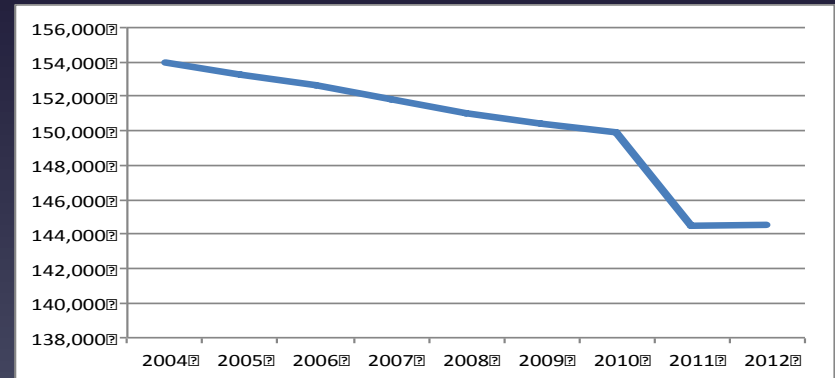
# Background - 2

Outside of the evacuation directive area, the agricultural, forestry and fishery industries have been in decline, the number of tourists has decreased, and this has in turn influenced wildlife.



**Fig1. Total number of the tourist in Fukushima Prefecture**

Source: Government of the Prefecture of Fukushima



**Fig2. Area under cultivation in Fukushima Prefecture (ha)**

Source: Ministry of Agriculture, Forestry and Fisheries

# Case Studies

## Protected areas related to the nuclear disaster

### •Chernobyl Disaster

1. The Exclusion Zone and the Zone of Absolute (mandatory) resettlement (Ukraine)
2. Polesye State Radiation Ecological Reserve (Belarus)

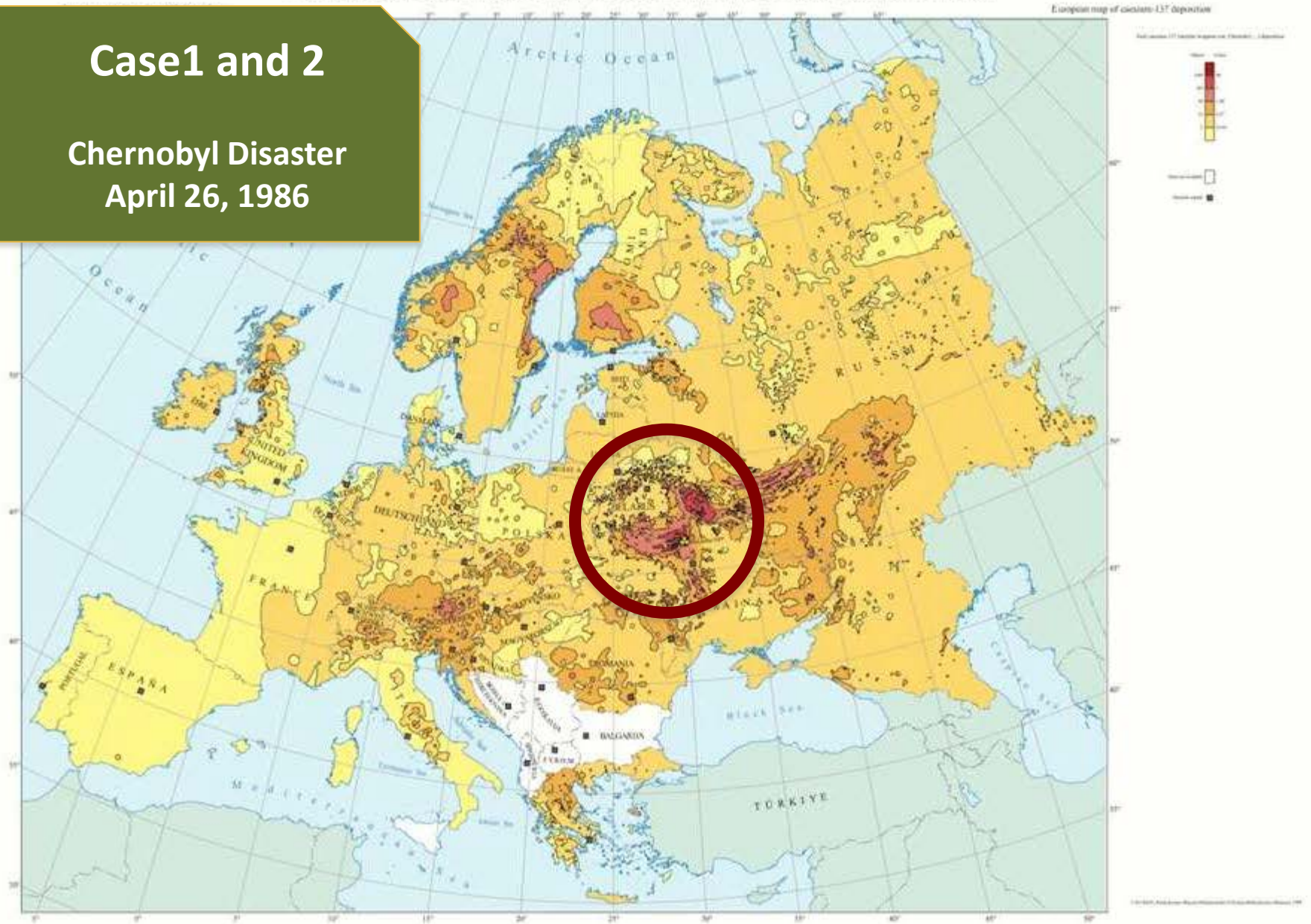
### •Rocky Flats Plant

3. Rocky Flats National Wildlife Refuge (Colorado, USA)

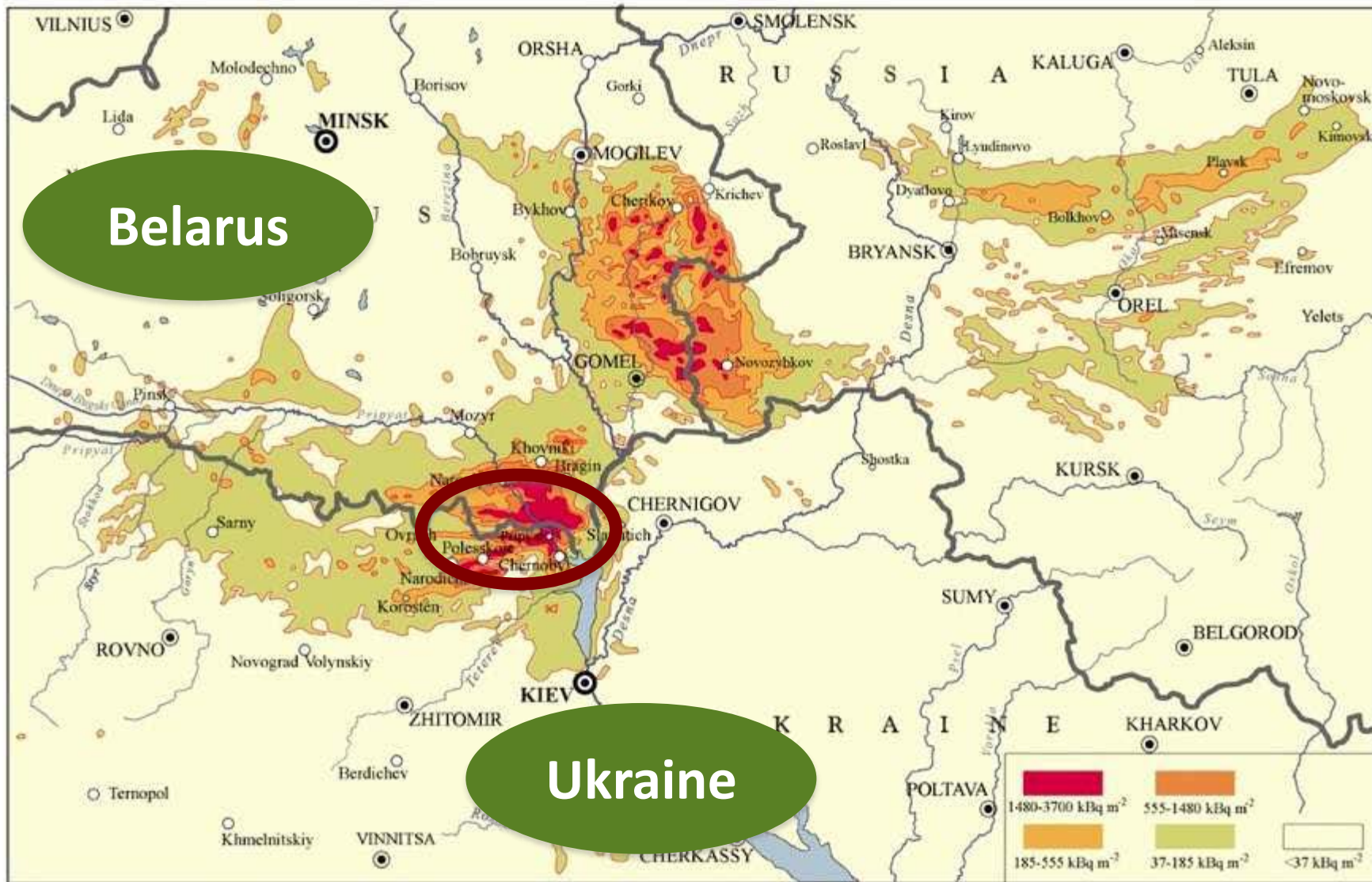
Surface ground deposition of caesium-137 released in Europe after the Chernobyl accident

## Case1 and 2

Chernobyl Disaster  
April 26, 1986



Source: UNSCEAR <<http://www.unscear.org/unscear/en/chernobylmaps.html>>



Surface ground deposition of caesium-137 released in the Chernobyl accident

200km



# Case1: Ukraine

## The Exclusion Zone and the Zone of Absolute (mandatory) resettlement



Source: CHERNOBYL TOUR <<https://chernobyl-tour.com/>>

### Management

State Agency of Ukraine on the Exclusion Zone Management

### Parent department

State Emergency Service of Ukraine

# The Exclusion Zone and the Zone of Absolute (mandatory) resettlement: *Action*

- Zonal management and monitoring
- Long-term safekeeping and disposal of the radioactive waste
- Sell-and-lease agreement of the land in the zone
- Maintenance of a mark and the fence
- Adjustment of the Chernobyl nuclear power plant decommissioning
- Registration of the victim

# CHERNOBYL TOUR®

Official provider of Chernobyl Exclusion Zone



Home

Tours

Request for travel

Payment & Refund

FAQ

Forum

Contacts



## The Chernobyl-tourists' reviews



Dosimeter-radiometer  
**TERRA-P**



Menu



Home

About Chernobyl-TOUR

The tourists' reviews

Journeys

- 1-day scheduled trips
- Several-day scheduled trips
- Private tours
- **APPLICATION for the tour**
- Payment and refund

### Chemobyl-TOUR®

*An eye-opening experience.*  
Marylyn, Ohio, US

*Thank you for all of your hard work, you were an amazing tour guide and your guidance is on an important topic all human beings living in this global society should know about.*  
Elise, Fulbright scholar, US

Chernobyl is the most famous Ukrainian phenomenon. If you plan to visit Ukraine or are already in the country, don't miss the most important and unique experience and site.

### The next trips:

**9.11 10.11 16.11**

The registration for the nearest tour to Chernobyl will be closed:

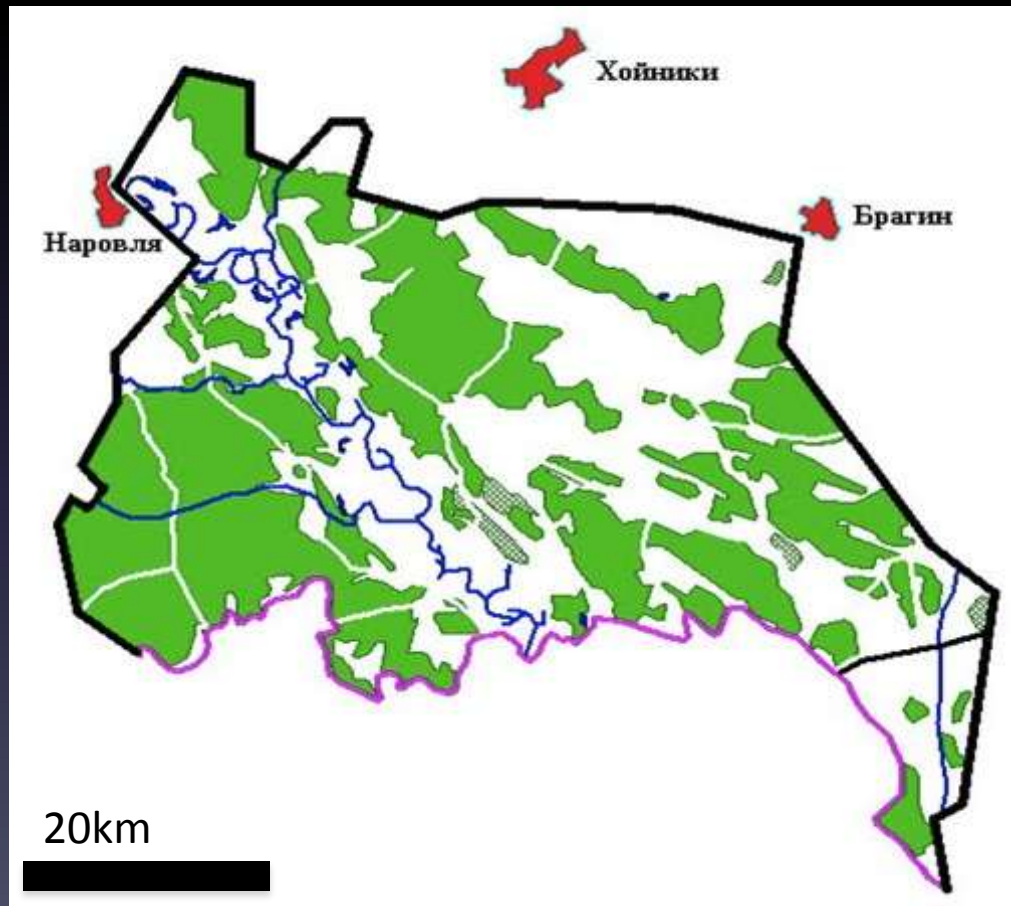
**2 04 07 38**

Source: CHERNOBYL TOUR <<https://chernobyl-tour.com/>>

Admit the tourism in zones formally from 2011

# Case2: Belarus

## Polesye State Radiation Ecological Reserve



### Management

Department on liquidation of the consequences of the accident on the Chernobyl NPP

### Parent department

Ministry of Emergency Measures of Belarus

# **Polesye State Radiation Ecological Reserve:**

## ***Action***

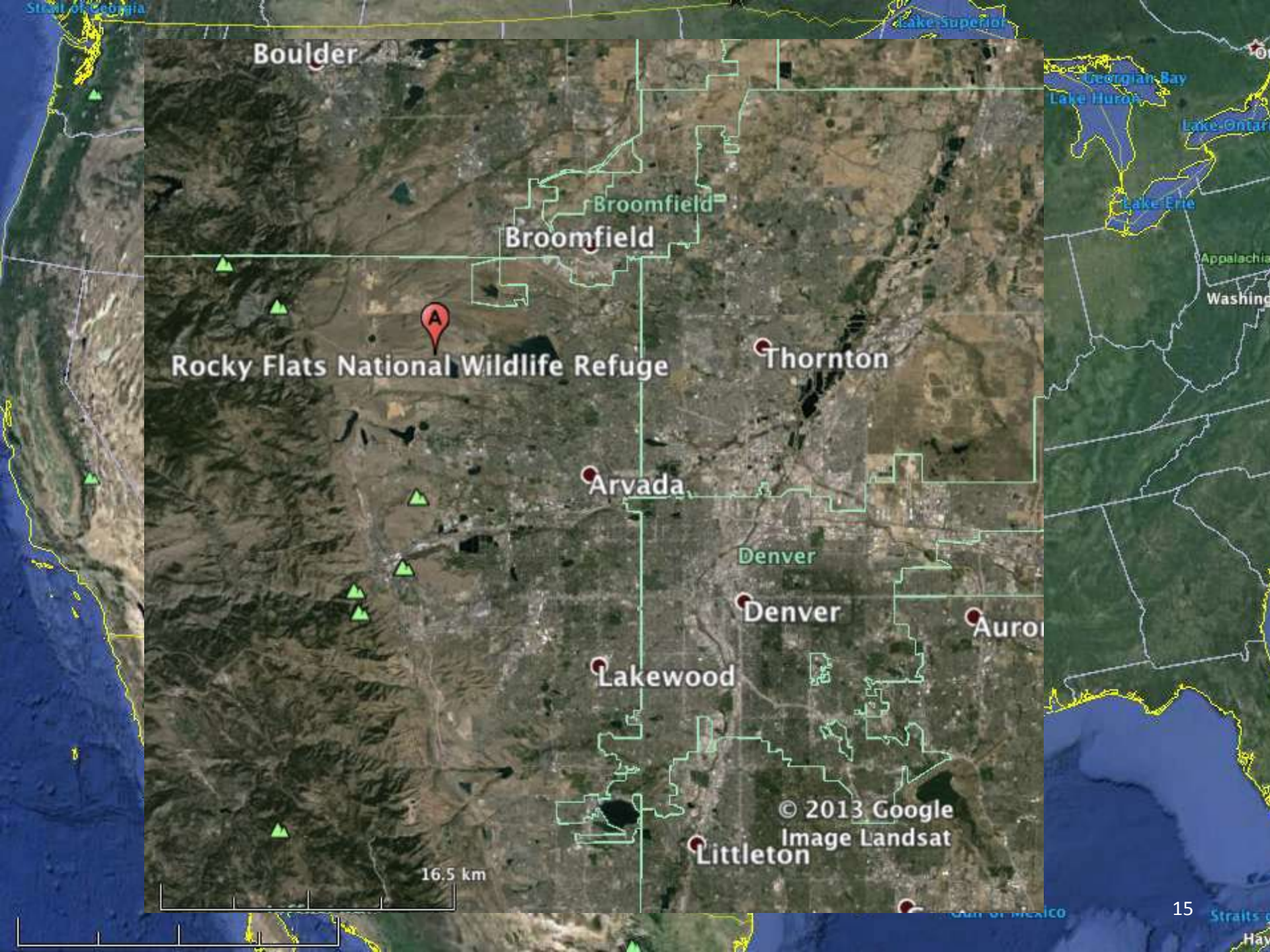
- Enforcement of radiological nonproliferation measures
- Monitoring of the change of the radioactive level
- Environmental monitoring
- Development of the rehabilitation method
- Impact statement to the animals and plants of the radiation
- Prevention of unjust invasion for wild animal protection

# Polesye State Radiation Ecological Reserve: *Natural environment*

**Table 1. Species in PSRER**

	Belarus All	in PSRER	Red book of Belarus
vascular plants	nearly 1700	884 (52%)	38 (Protected plants)
Mammals	60	46 (77%)	7 (6 were registered in last few years)
Birds	250 (Polessiye)	206 (82%)	54
Reptiles	7	7 (100%)	0
amphibians	13	10 (77%)	0

Source: PSRER <<http://www.zapovednik.by/>>



Boulder

Broomfield

Rocky Flats National Wildlife Refuge

Thornton

Arvada

Denver

Denver

Aurora

Lakewood

Littleton

© 2013 Google  
Image Landsat

16.5 km

# Case3: Colorado, USA

## Rocky Flats National Wildlife Refuge

Nuclear Weapons Site Becomes a Wildlife Refuge

- Entity Conversion

1952~1977: Atomic Energy Commission

1977~2007: United States Department of Energy

2007~: U.S. Fish and Wildlife Service (nearly 1,600 ha)

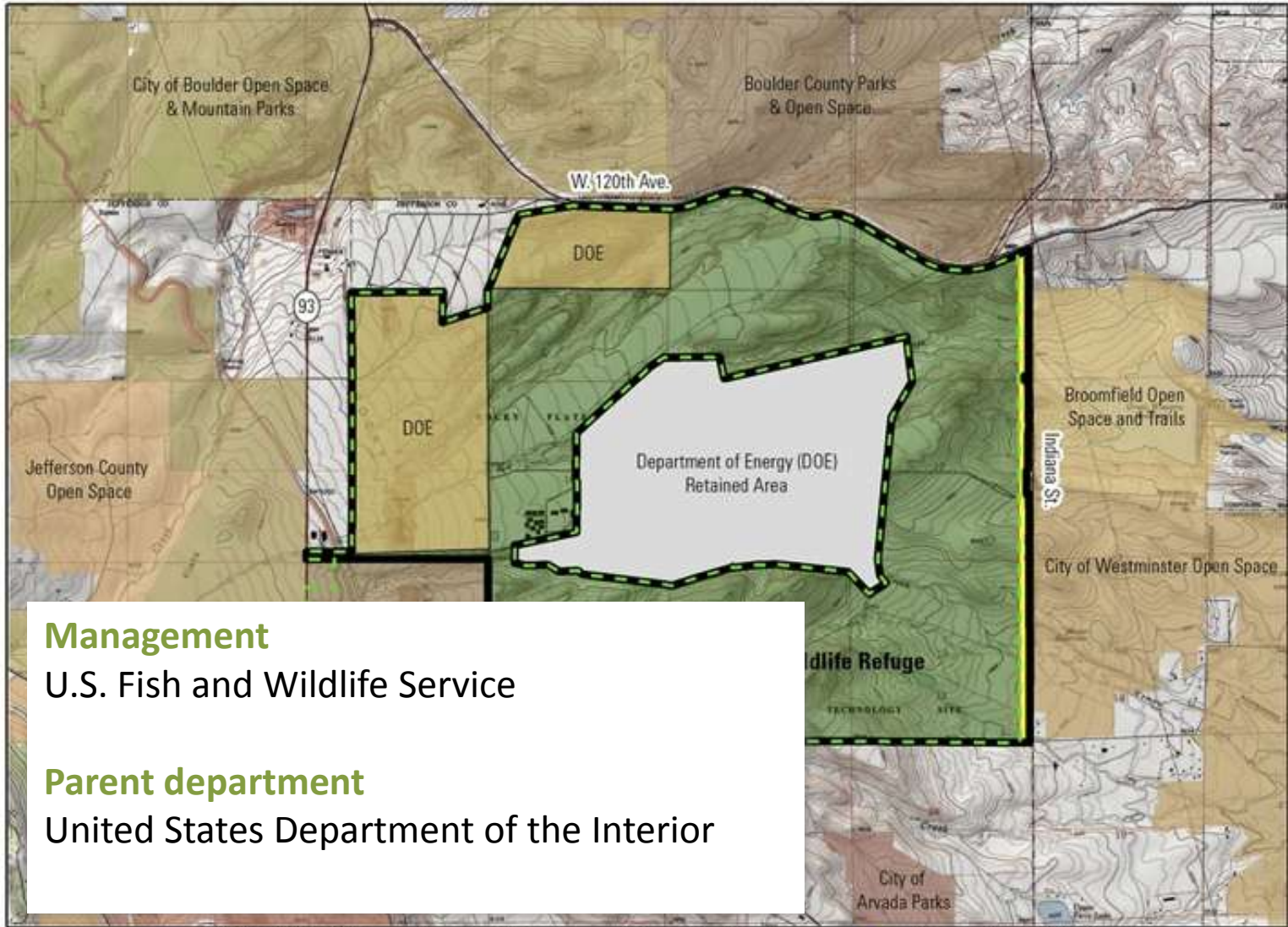


In 1995



In 2005





**Management**

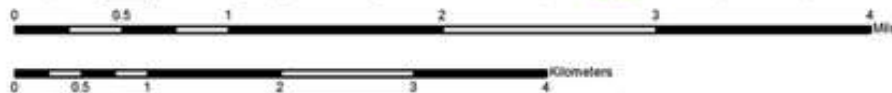
U.S. Fish and Wildlife Service

**Parent department**

United States Department of the Interior

300 Foot Right of Way    Existing Approved Acquisition Boundary    Proposed Acquisition Boundary

PRODUCED IN THE DIVISION OF REFUGE PLANNING  
 DENVER, COLORADO  
 MAP DATE: 07/12/2011  
 BASEMAP: NGS, TOPO, US, 3D  
 6TH PRINCIPAL MERIDIAN  
 FILE: W:\CO\WFL\MAPS\RFL\_LINREA\_0711\WFL\_LANDSTATUS\_071111



**Elk**



***Preble's Meadow Jumping Mouse***



***Bald Eagle***



***Burrowing Owl***



Photos: U.S. Fish & Wildlife Service



# Rocky Flats National Wildlife Refuge:

## *Purpose*

- Restoring and preserving native ecosystems
- Providing habitat and population management for native plants and migratory and resident wildlife
- Conserving threatened and endangered species
- Providing opportunities for compatible scientific research

# Rocky Flats National Wildlife Refuge:

## *Goals*




- Wildlife and habitat management
- Public use, education and interpretation
- Safety
- Effective and open communication
- Working with others
- Refuge operations

# Case Studies: *Features*

- There are Specialized Agencies of the zonal management in Ukraine and Belarus
- Rocky Flats Plant became the existing protected area
- Investigation into natural environments change
- Nature recovered by decrease of human influences
- Promotion of the use is planned in 3 sites

# Natural Parks in Fukushima

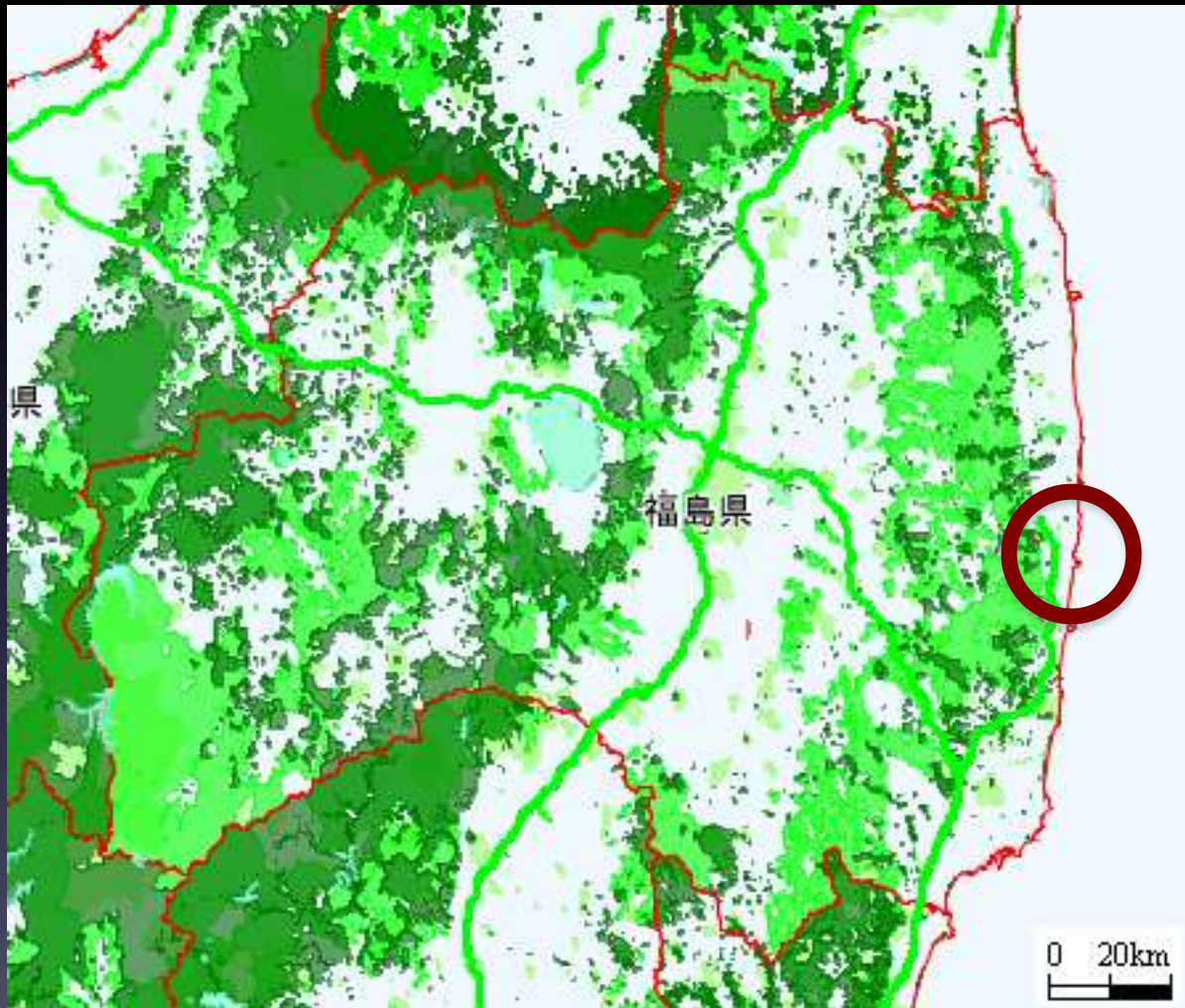


-  National Park
-  Quasi-National Park
-  Prefectural Nature Park

Source: National Land Information Division, National and Regional Policy Bureau.

<http://nrb-www.mlit.go.jp/webmapc/mapmain.html>

# Other Protected Areas in Fukushima

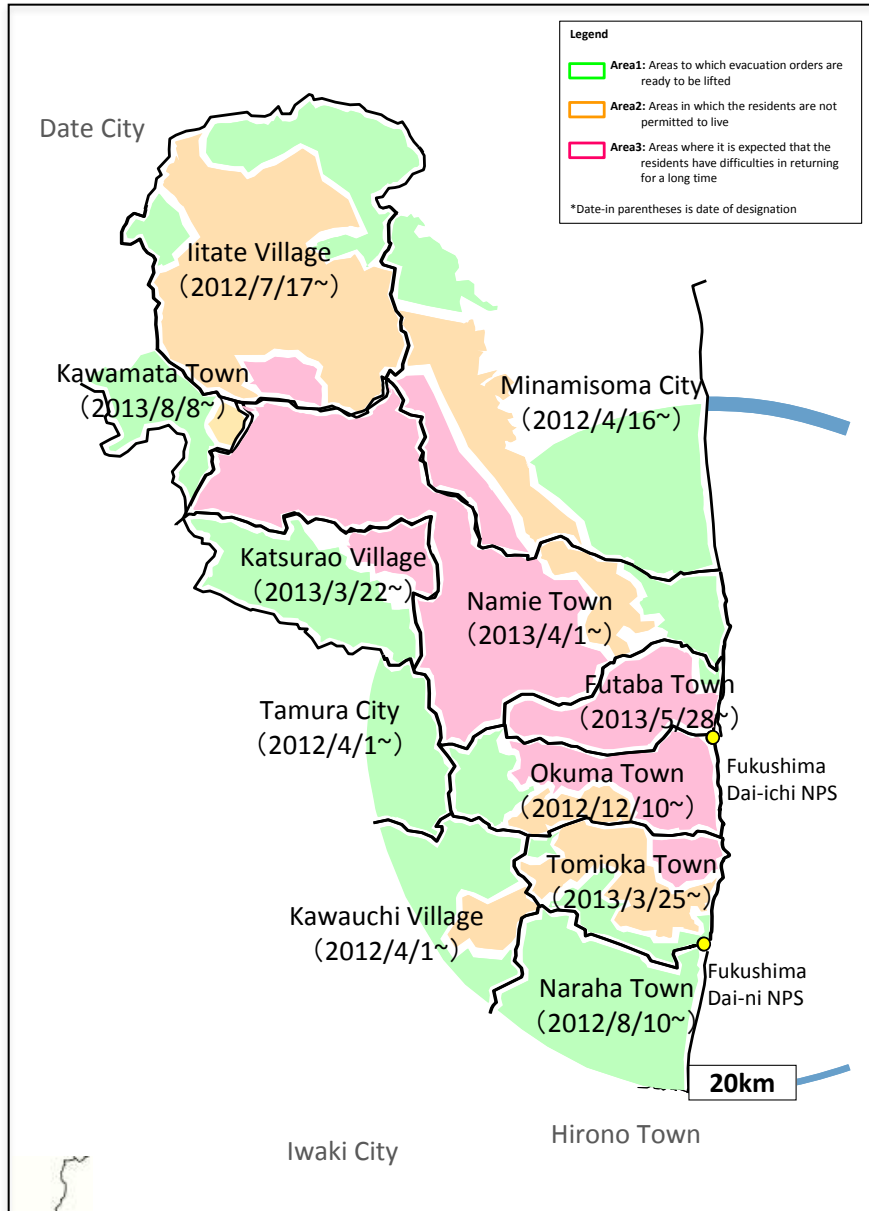


-  National Forest
-  Protection Forest
-  Wildlife Protection Area

Source: National Land Information Division, National and Regional Policy Bureau.

<http://nrb-www.mlit.go.jp/webmapc/mapmain.html>

Areas to which evacuation orders have been issued  
(August 7, 2013)



Source: Ministry of Economy, Trade and Industry

## Designate

Nuclear Emergency Response Headquarters  
(Establish by Act on Special Measures Concerning Nuclear Emergency Preparedness)

## Action

- restrict activities
- Radiological monitoring
- Decontamination





# Role of a Protected Area

- **Investigation into change of natural environments**
  - Sharing ecological information, providing environmental education
- **Formulation of land use plans for the future**
  - Example: Tourism

A wide landscape of a green field with mountains and a blue sky with clouds in the background. The foreground is filled with lush green grass and some taller, brownish stalks. In the middle ground, there are several small buildings and utility poles. The background features rolling green hills and mountains under a bright blue sky with scattered white clouds.

**Thank you very much.**