

Porcine Epidemic Diarrhea (PED) in Japan

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International Conference on novel Swine Enteric Coronavirus Disease viruses (nSECDv)
23-25 September 2014 Chicago, Illinois

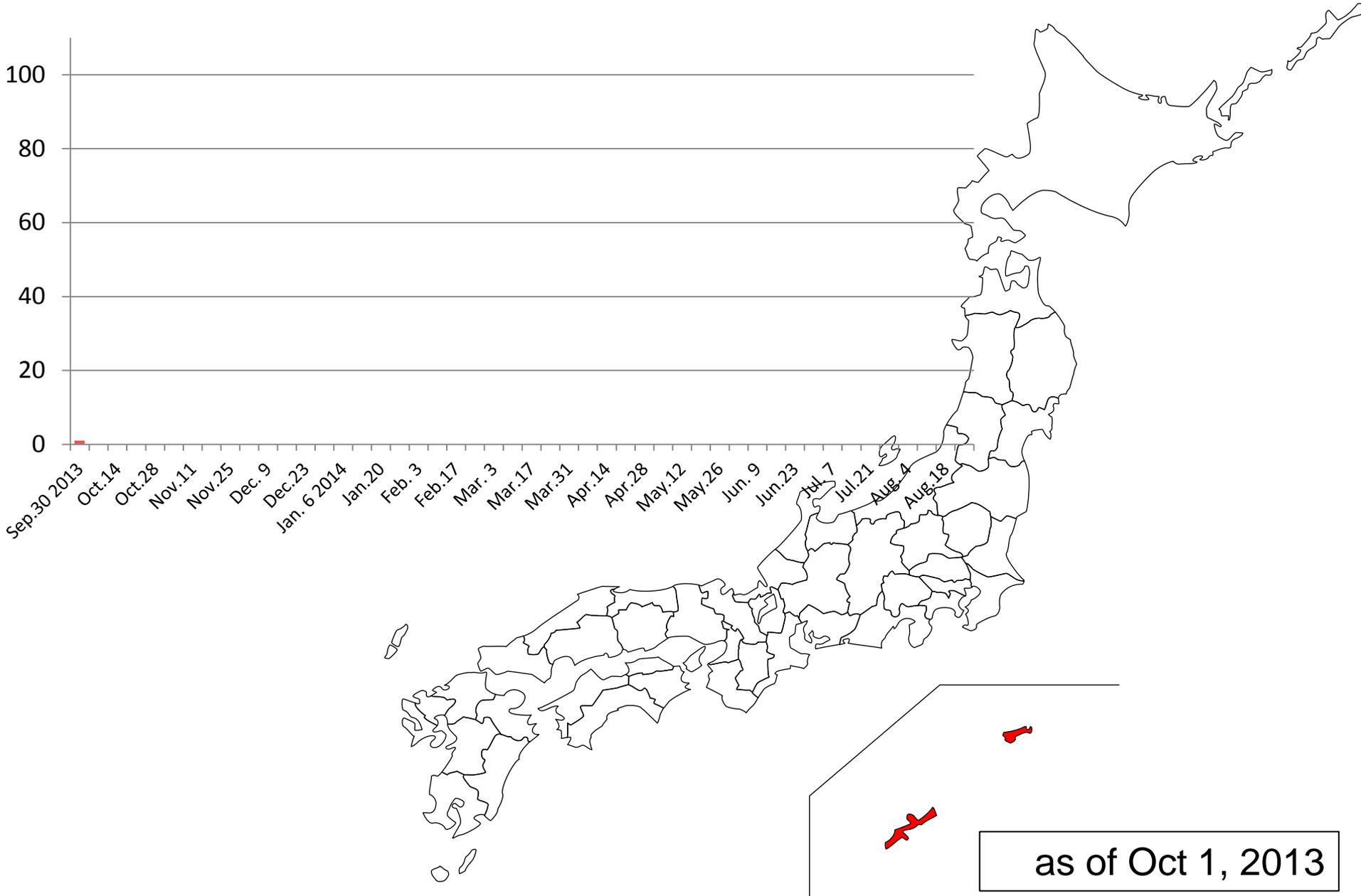
History of PED in Japan

- 1980s Sporadic outbreaks
- 1990s Large outbreaks
(Jan.1996- 80,000 cases and 40,000 piglets dead)
- Oct. 1996 Designated notifiable under the Act
- Nov.1996 Vaccine (Live) approved by MAFF
- 2000s Sporadic outbreaks
(Latest case found in 2006)

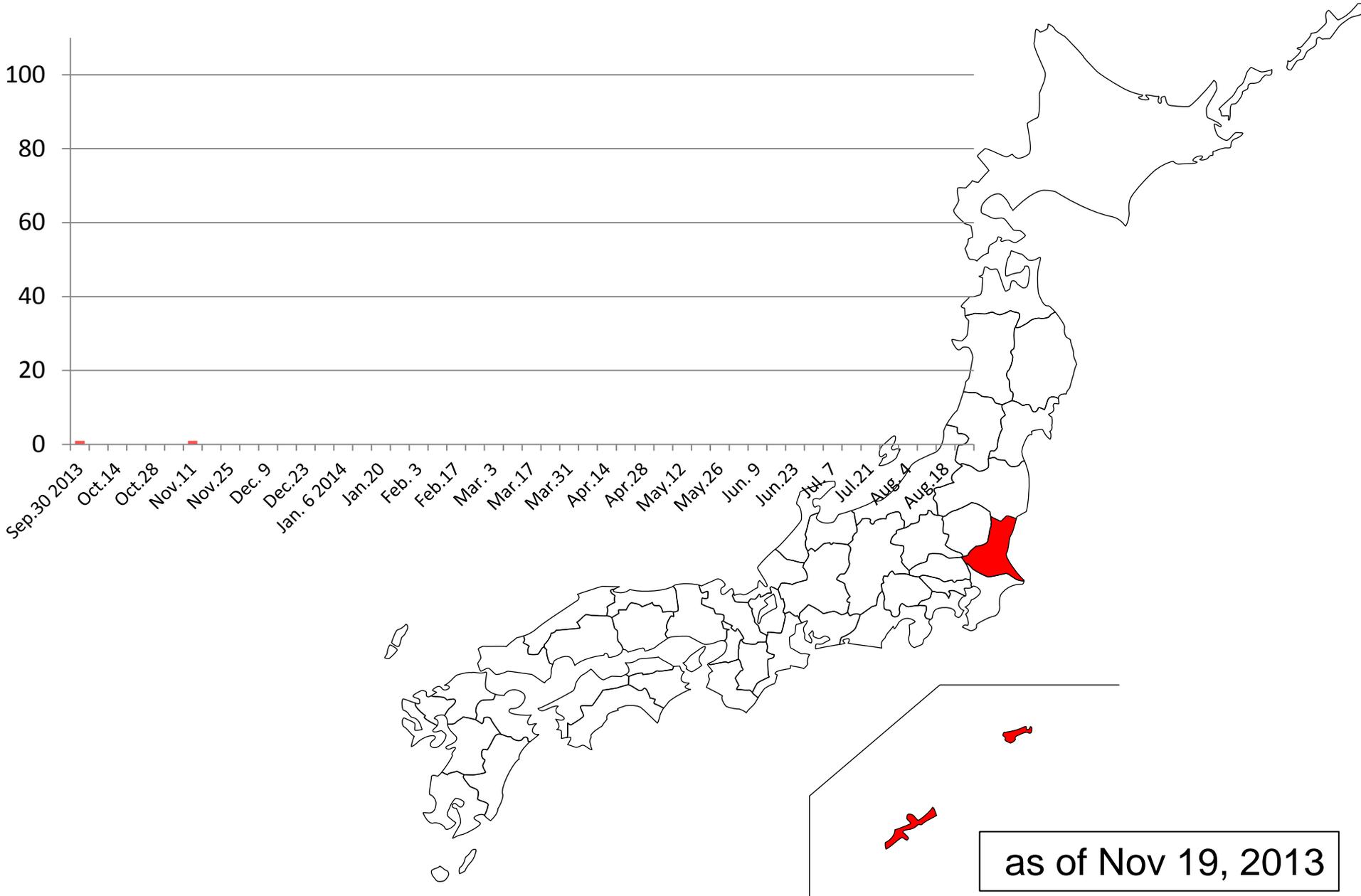
PED outbreaks since 2013

- Oct. 2013 New cases in Okinawa pref. after absence of 7 years
- Dec. 2013 Cases increased in the Southern Kyushu area
- Feb. 2014 Cases temporarily decreased in the Southern Kyushu area
- Mar. 2014 Cases increased again in the Southern Kyushu area
Has spread to the Northern Kyushu area and other prefectures across Japan
- Apr. 2014 Peak of outbreaks
- Jun. 2014 Decreased

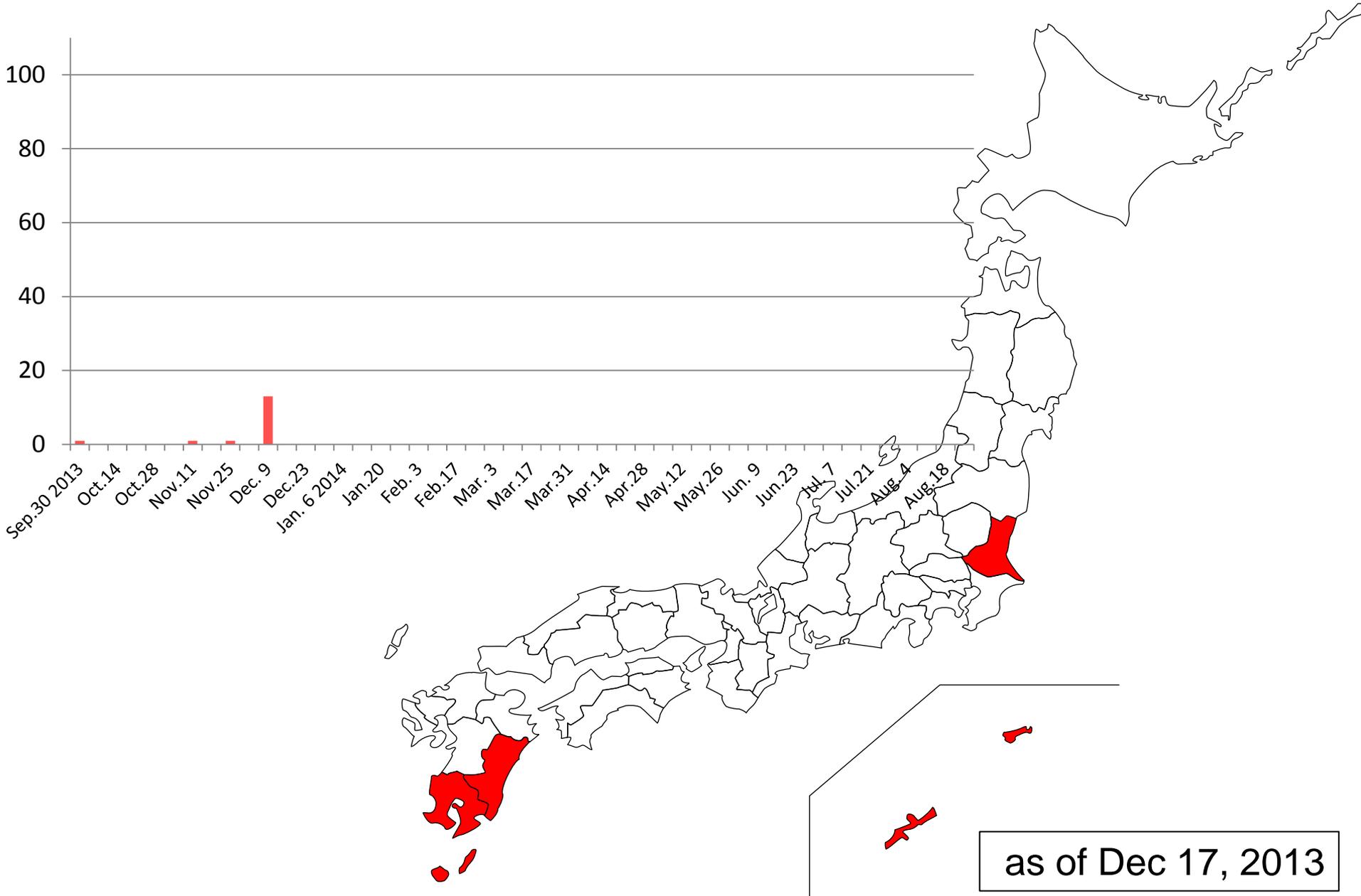
Confirmed cases of PED (Oct 2013 – Aug 2014)



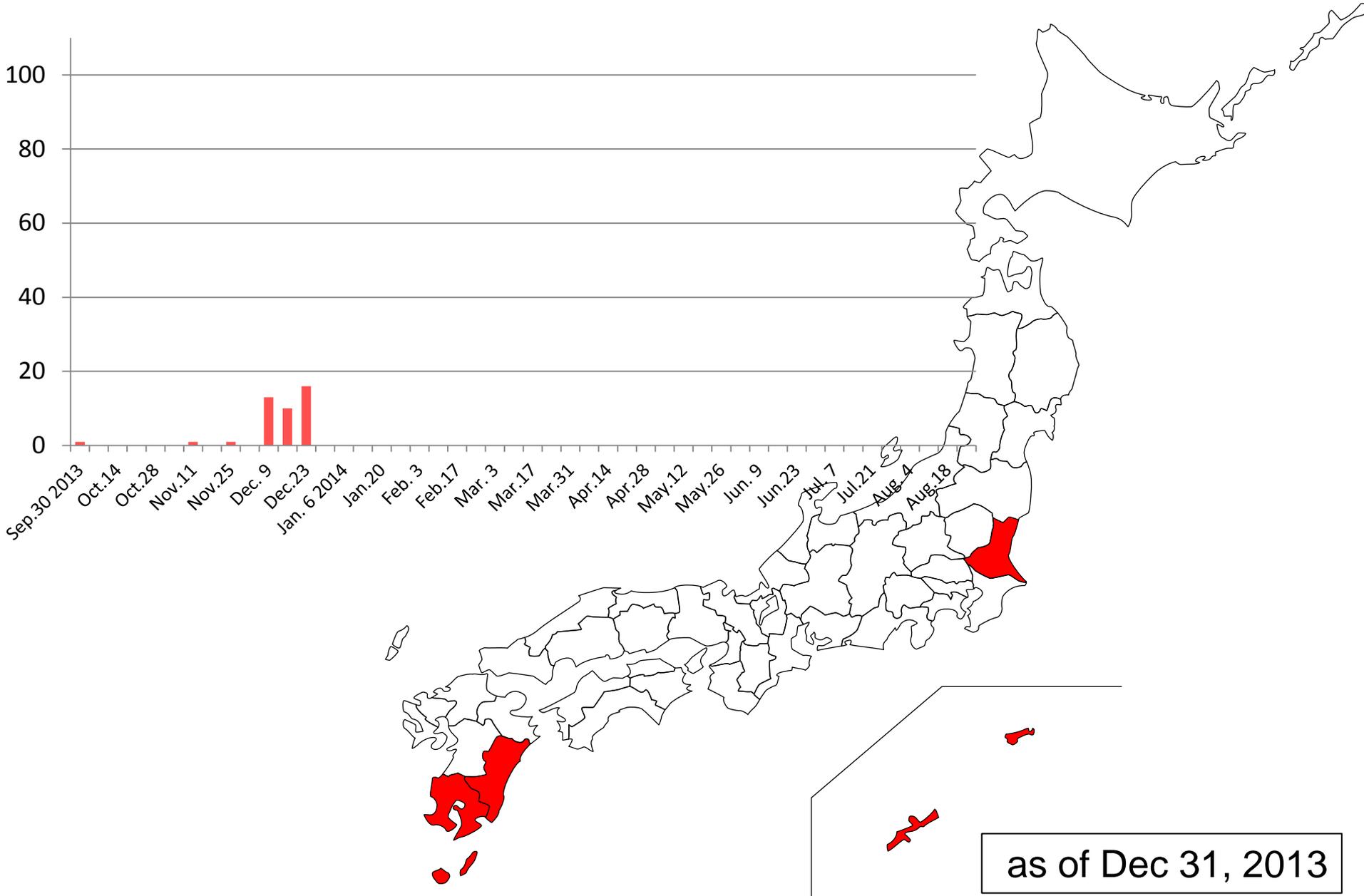
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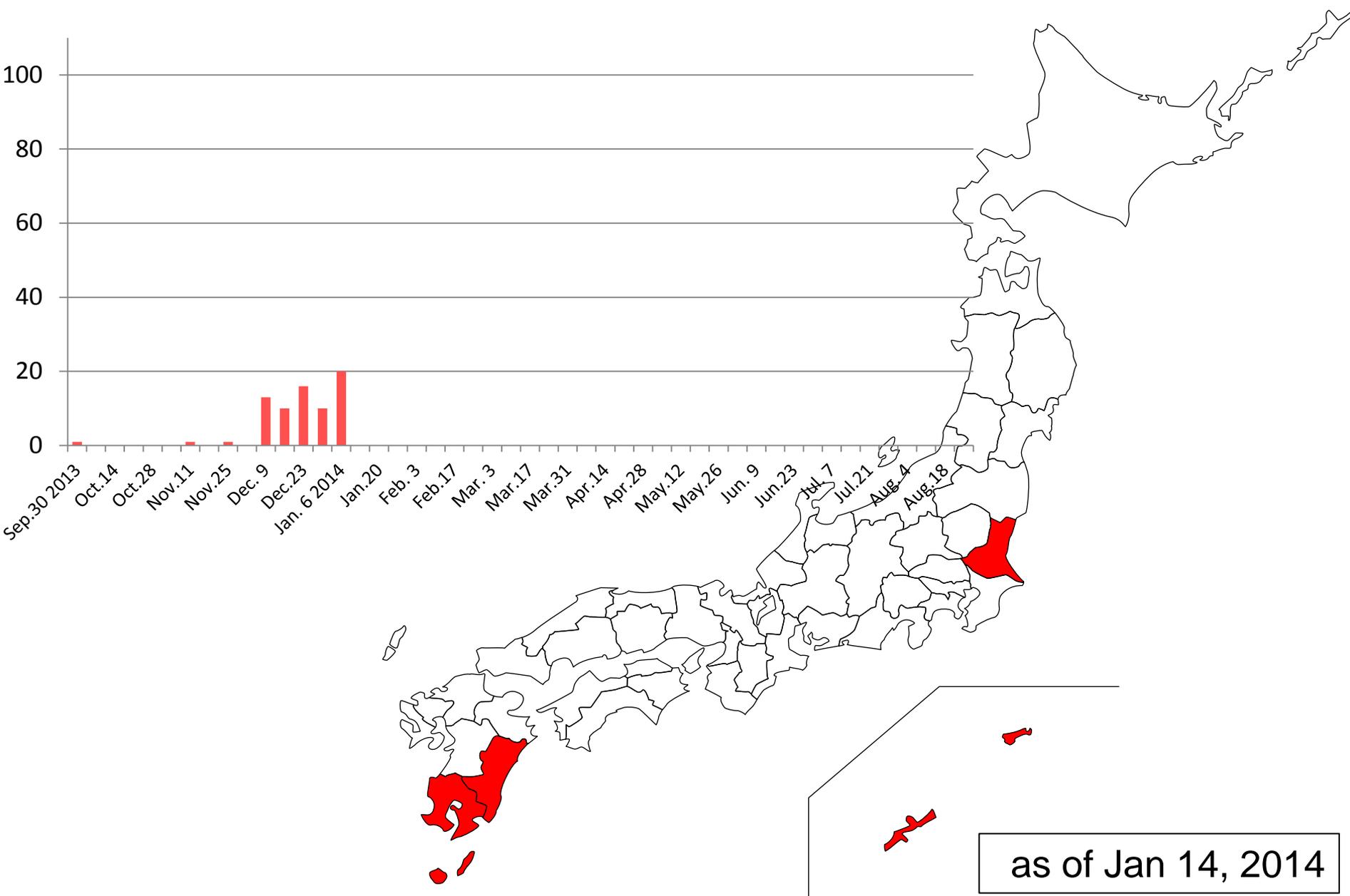


Confirmed cases of PED (Oct 2013 – Aug 2014)



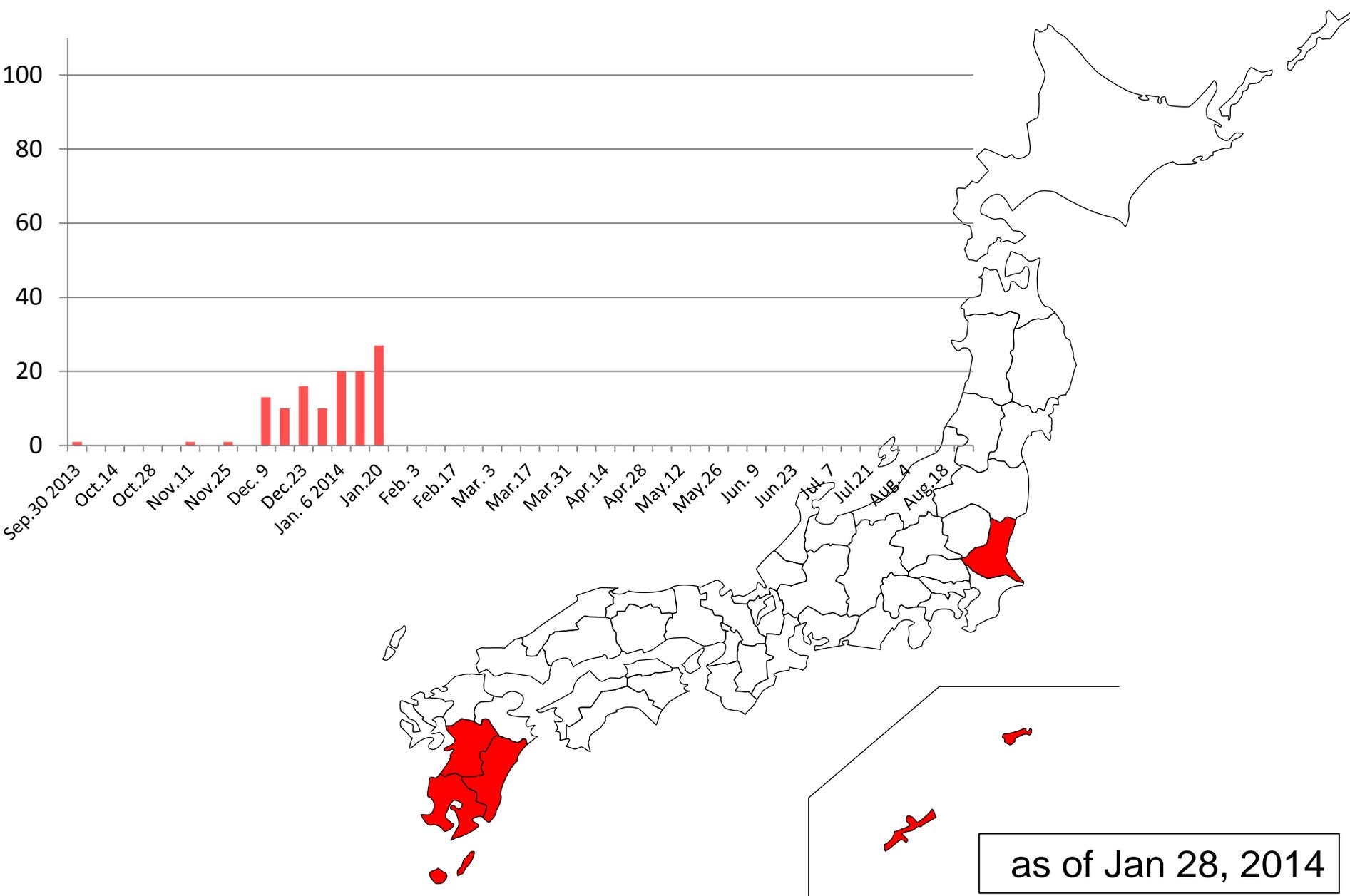
as of Dec 31, 2013

Confirmed cases of PED (Oct 2013 – Aug 2014)



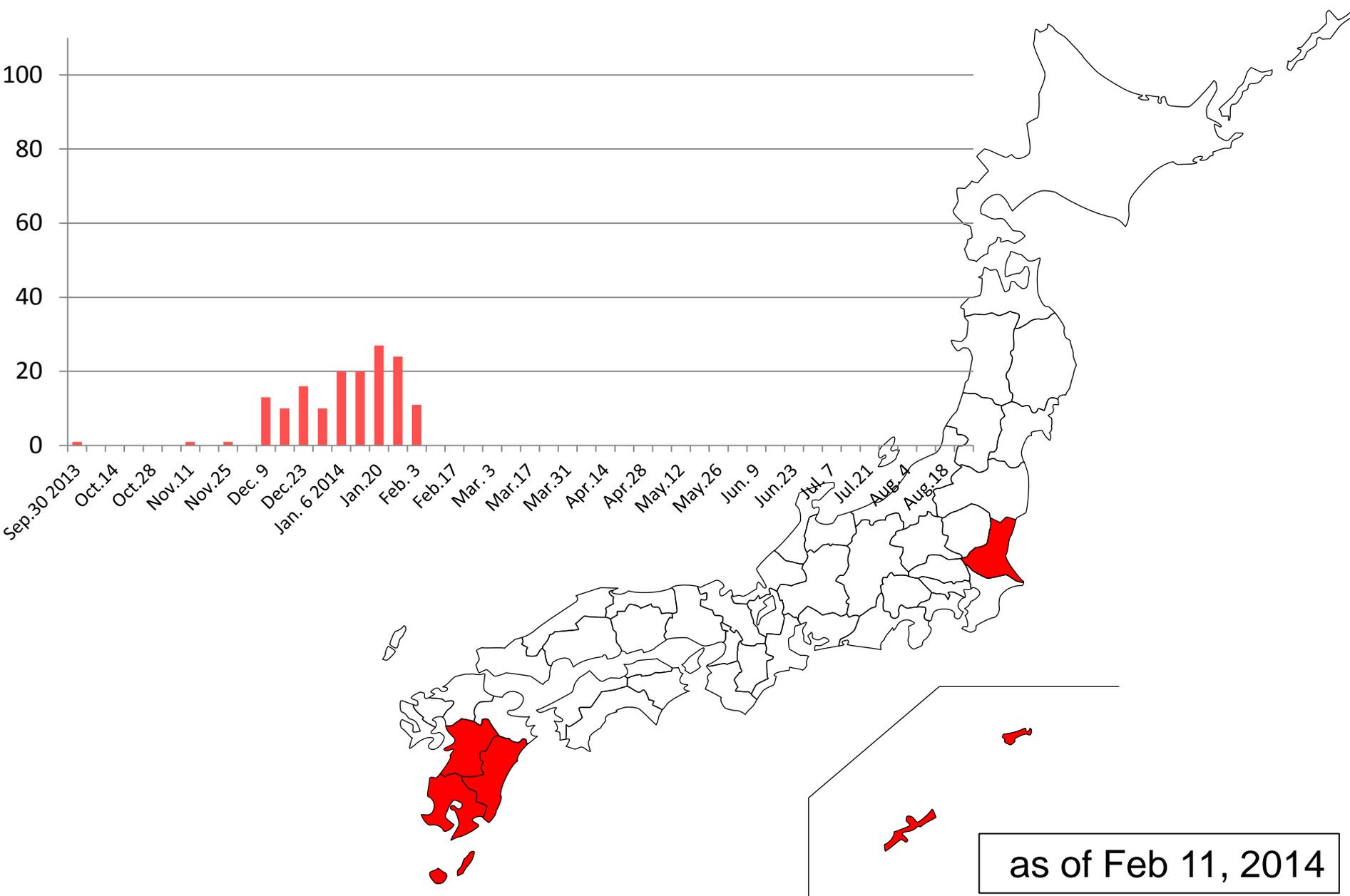
as of Jan 14, 2014

Confirmed cases of PED (Oct 2013 – Aug 2014)



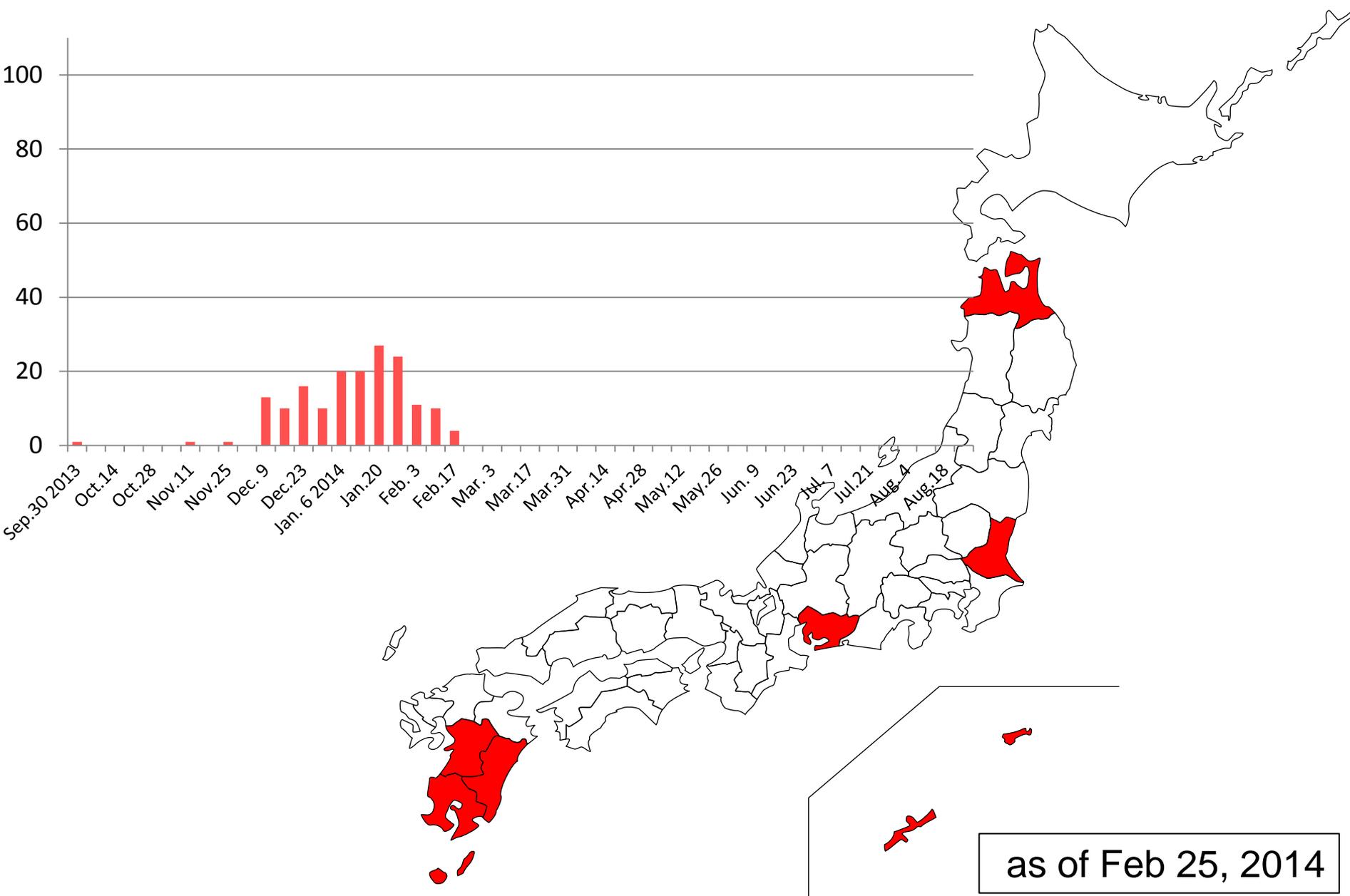
as of Jan 28, 2014

Confirmed cases of PED (Oct 2013 – Aug 2014)

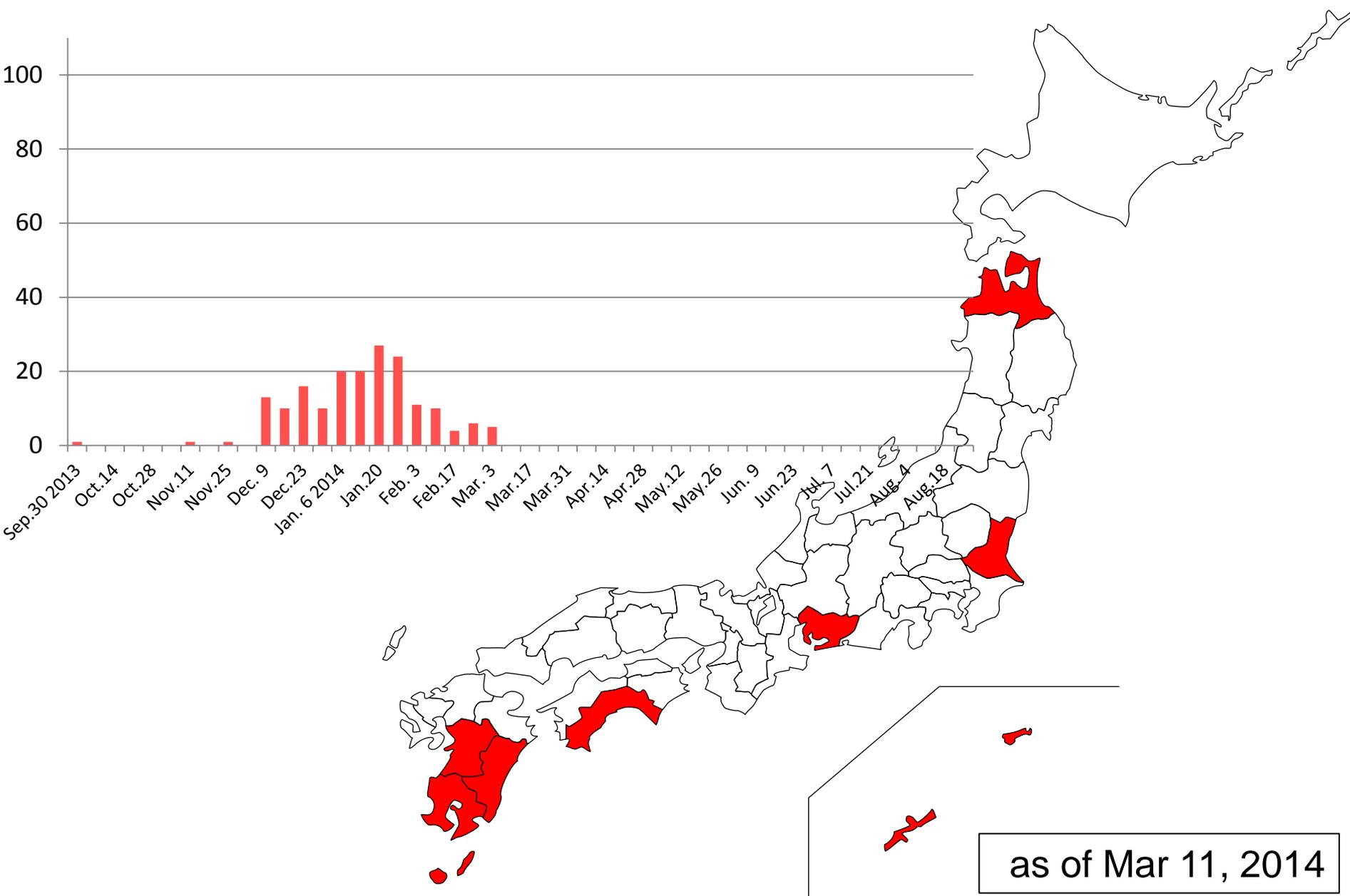


as of Feb 11, 2014

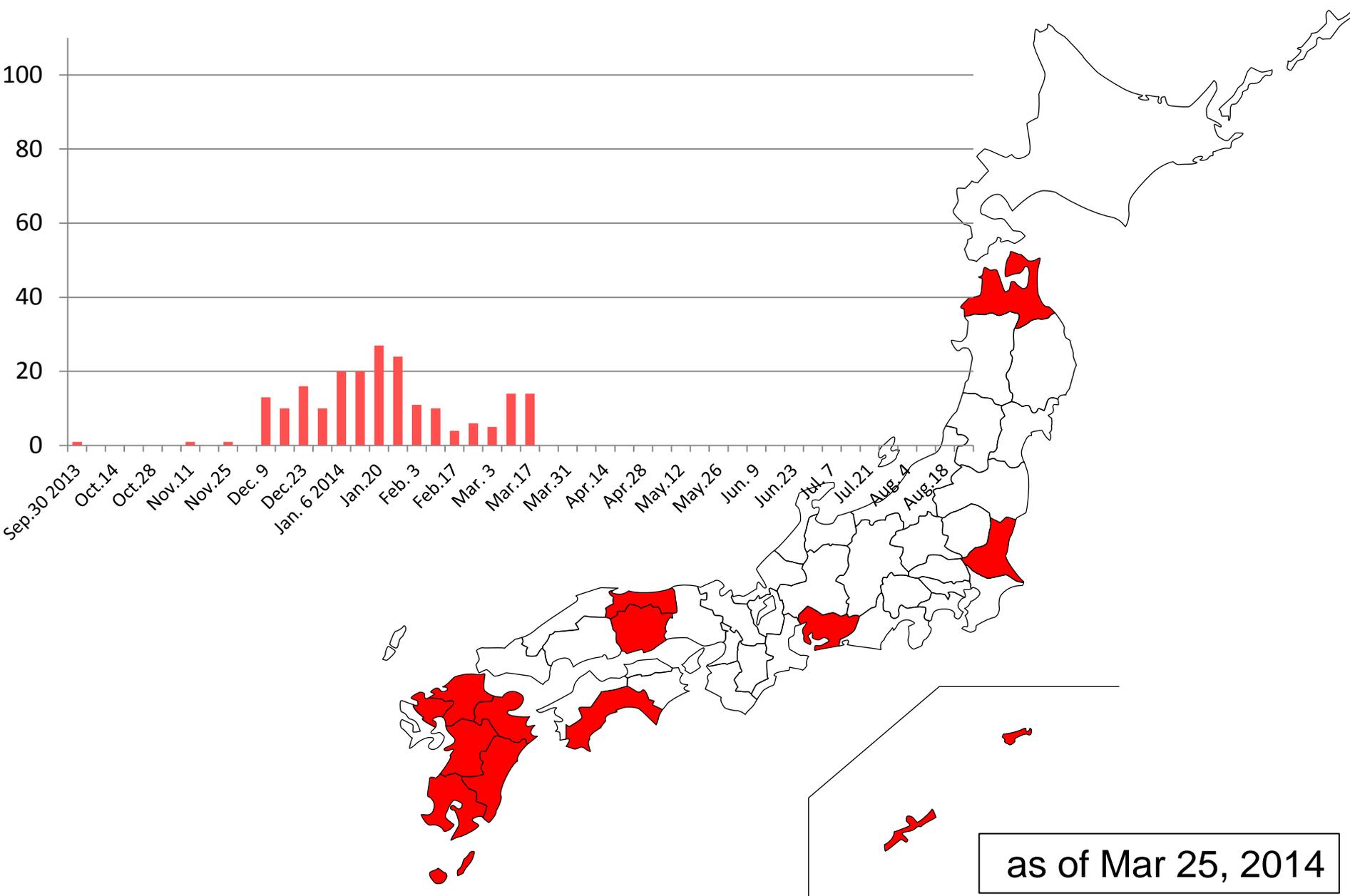
Confirmed cases of PED (Oct 2013 – Aug 2014)



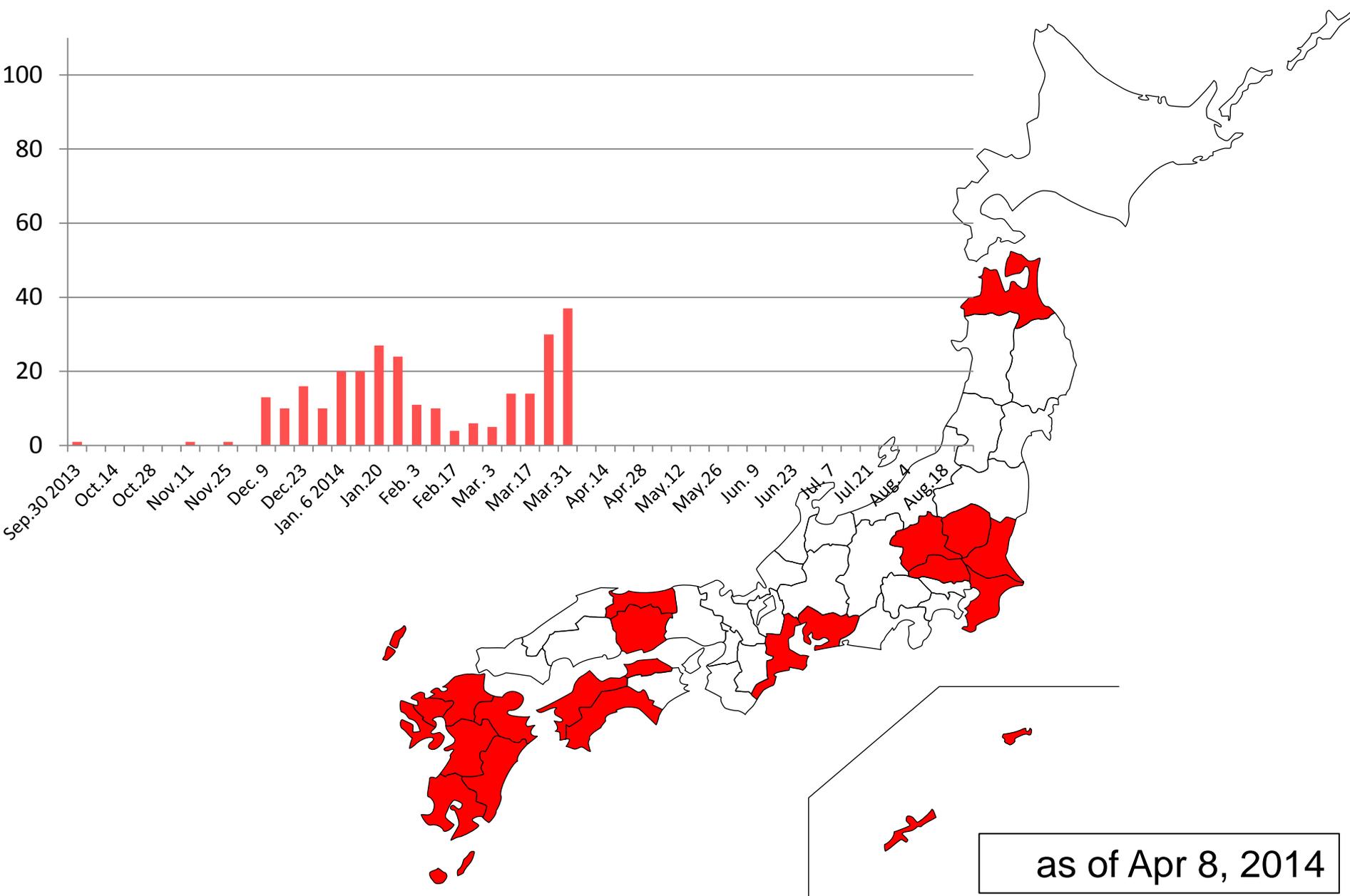
Confirmed cases of PED (Oct 2013 – Aug 2014)



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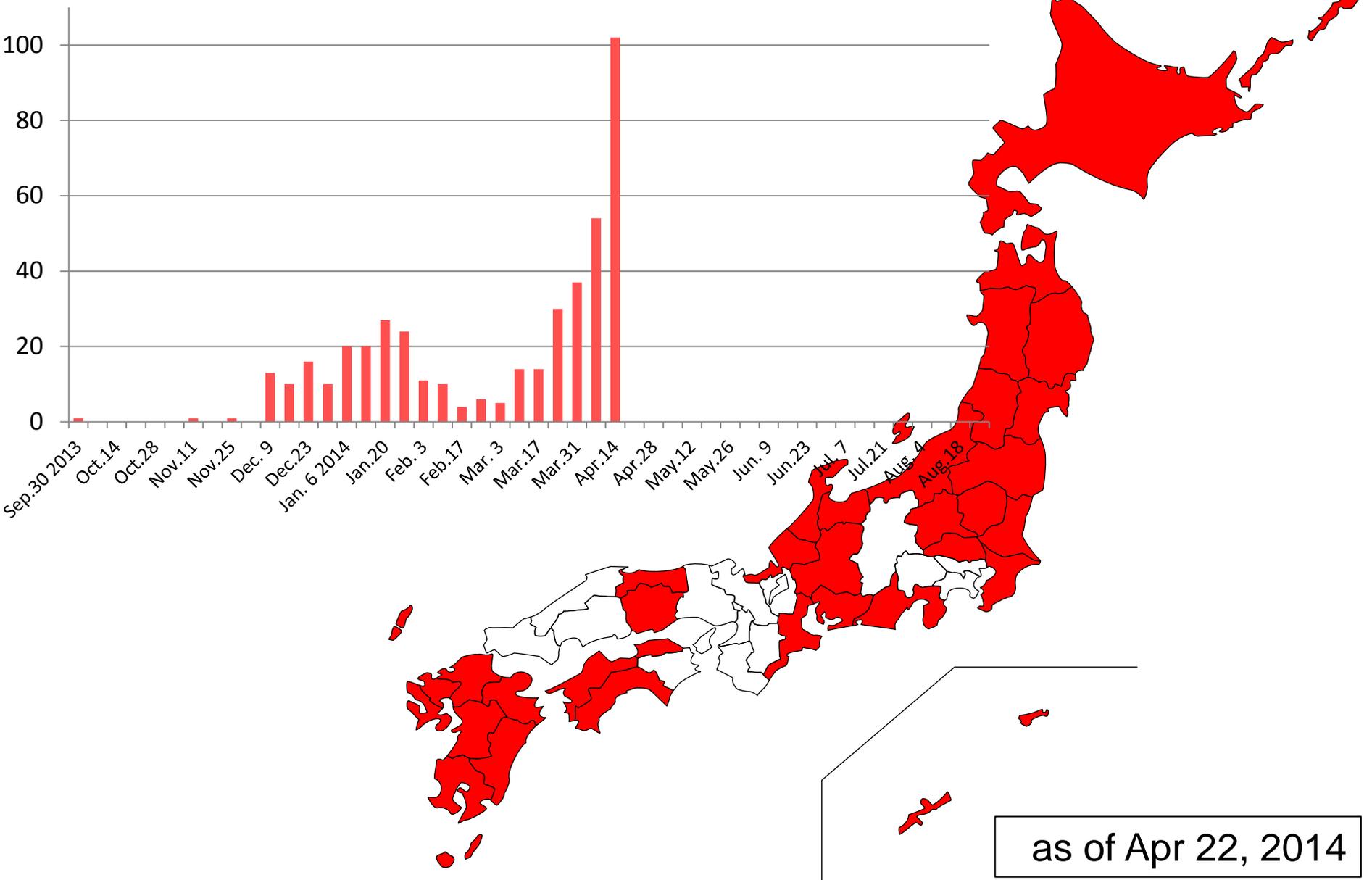


Confirmed cases of PED (Oct 2013 – Aug 2014)



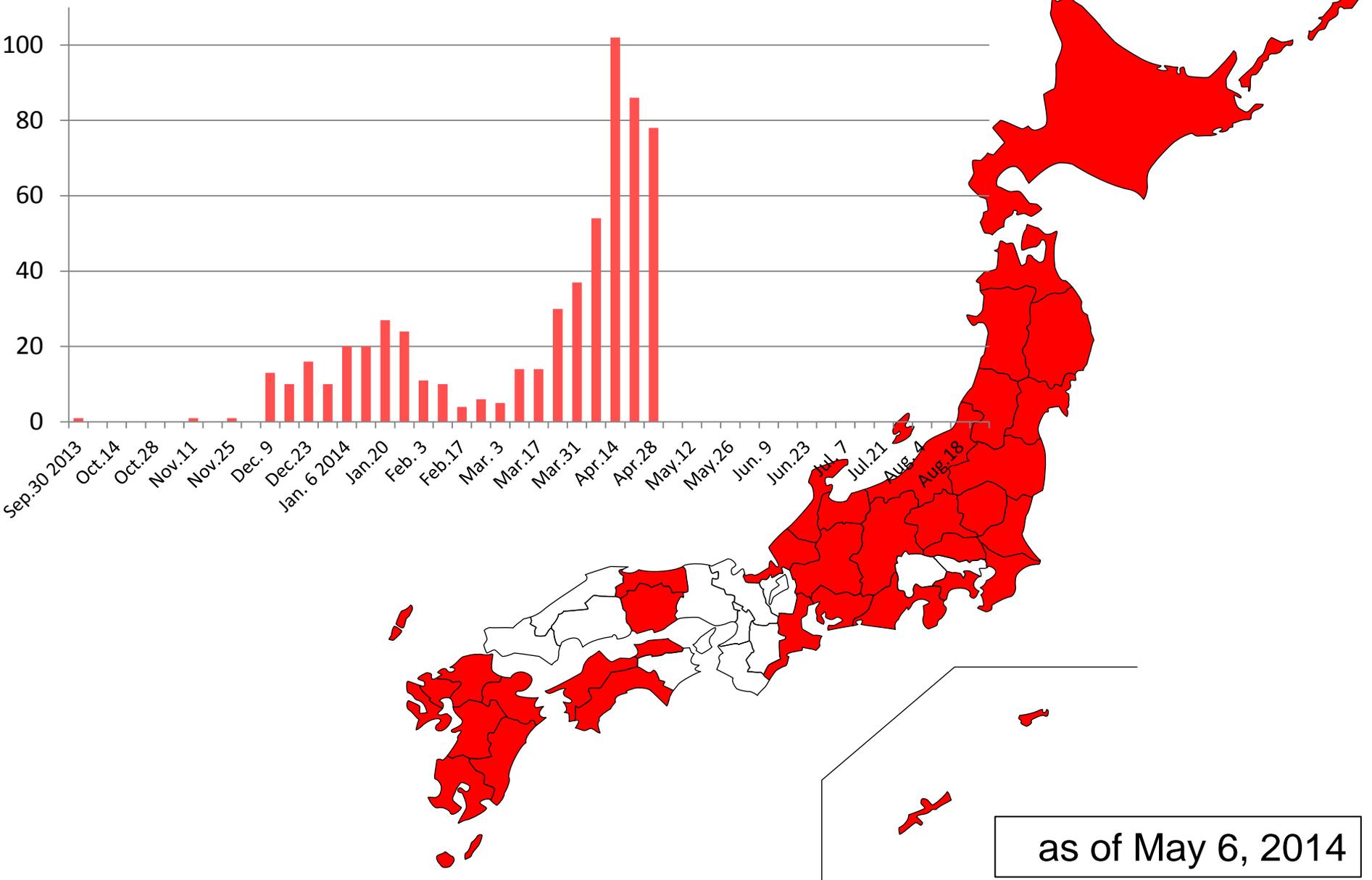
as of Apr 8, 2014

Confirmed cases of PED (Oct 2013 – Aug 2014)

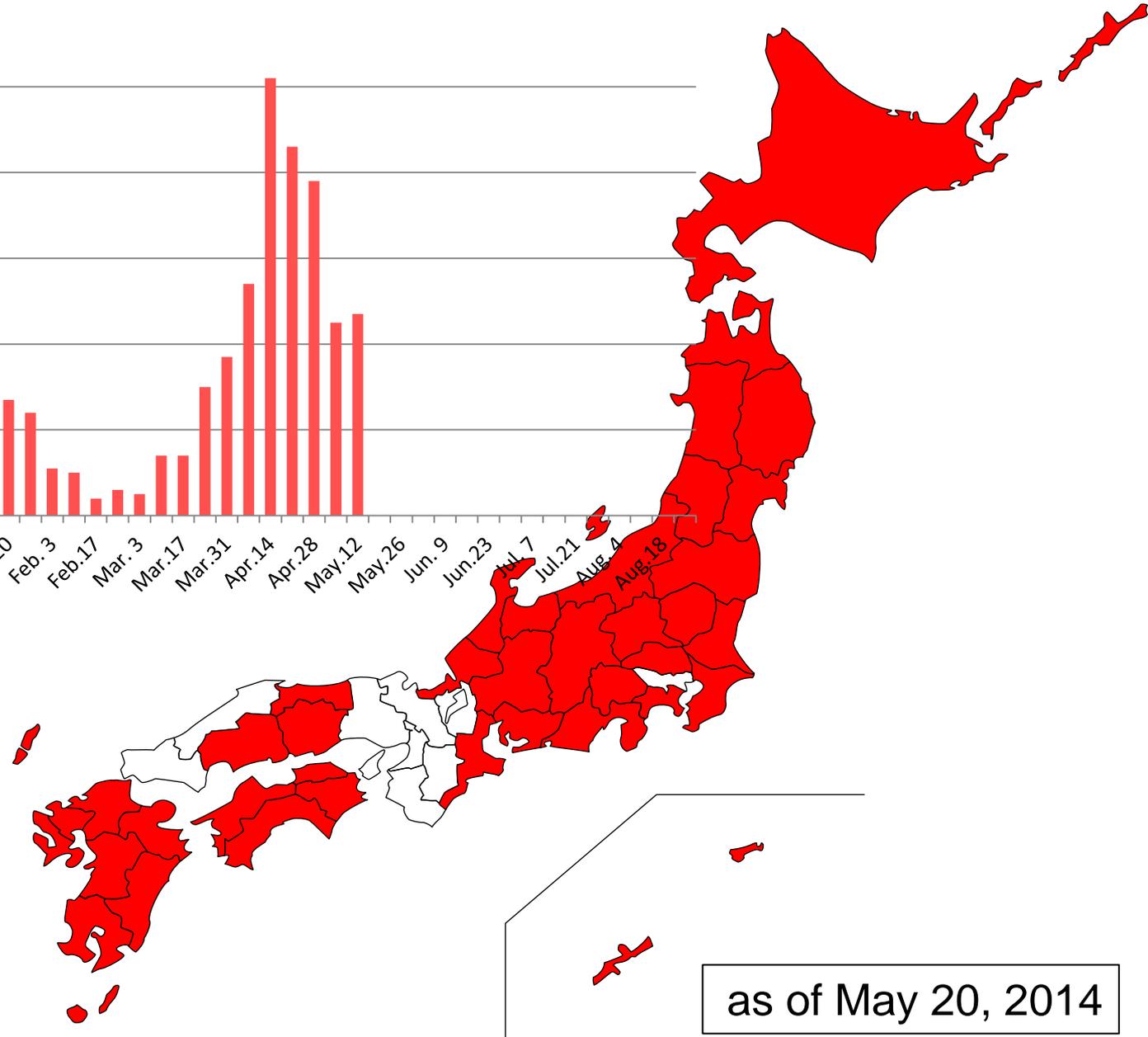
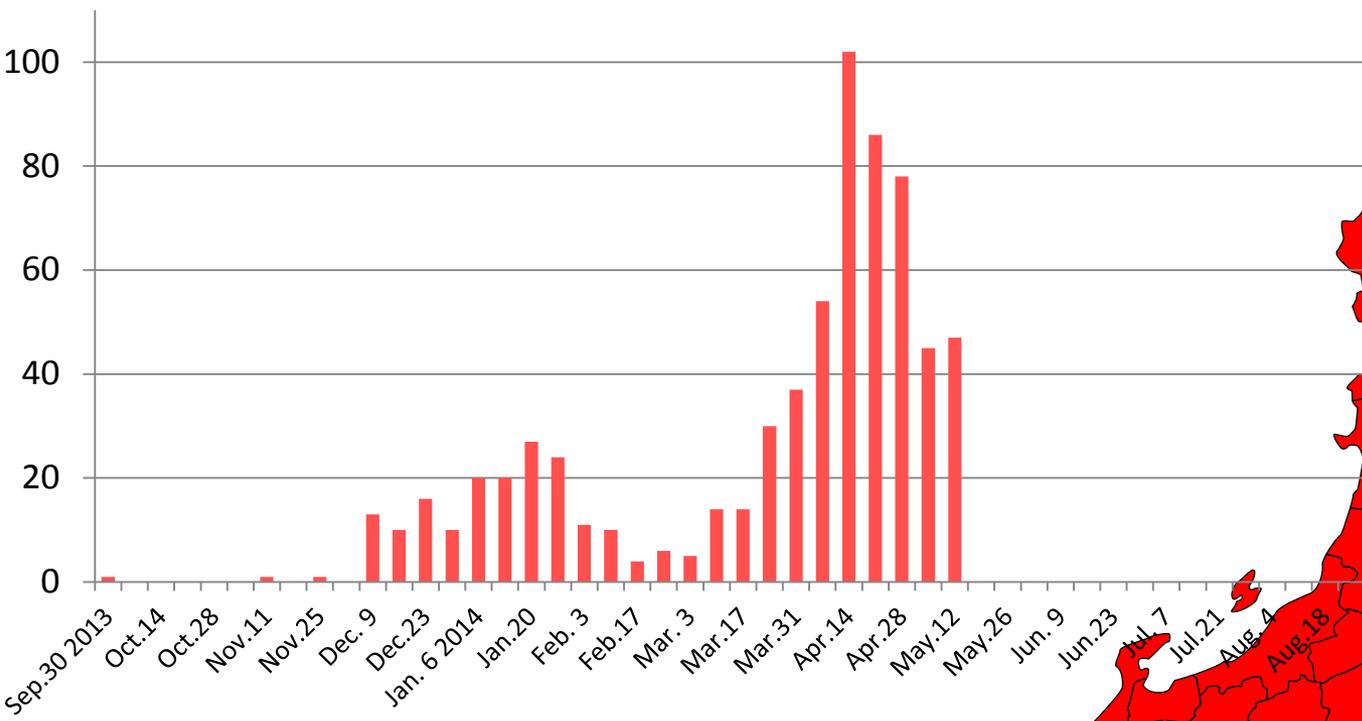


as of Apr 22, 2014

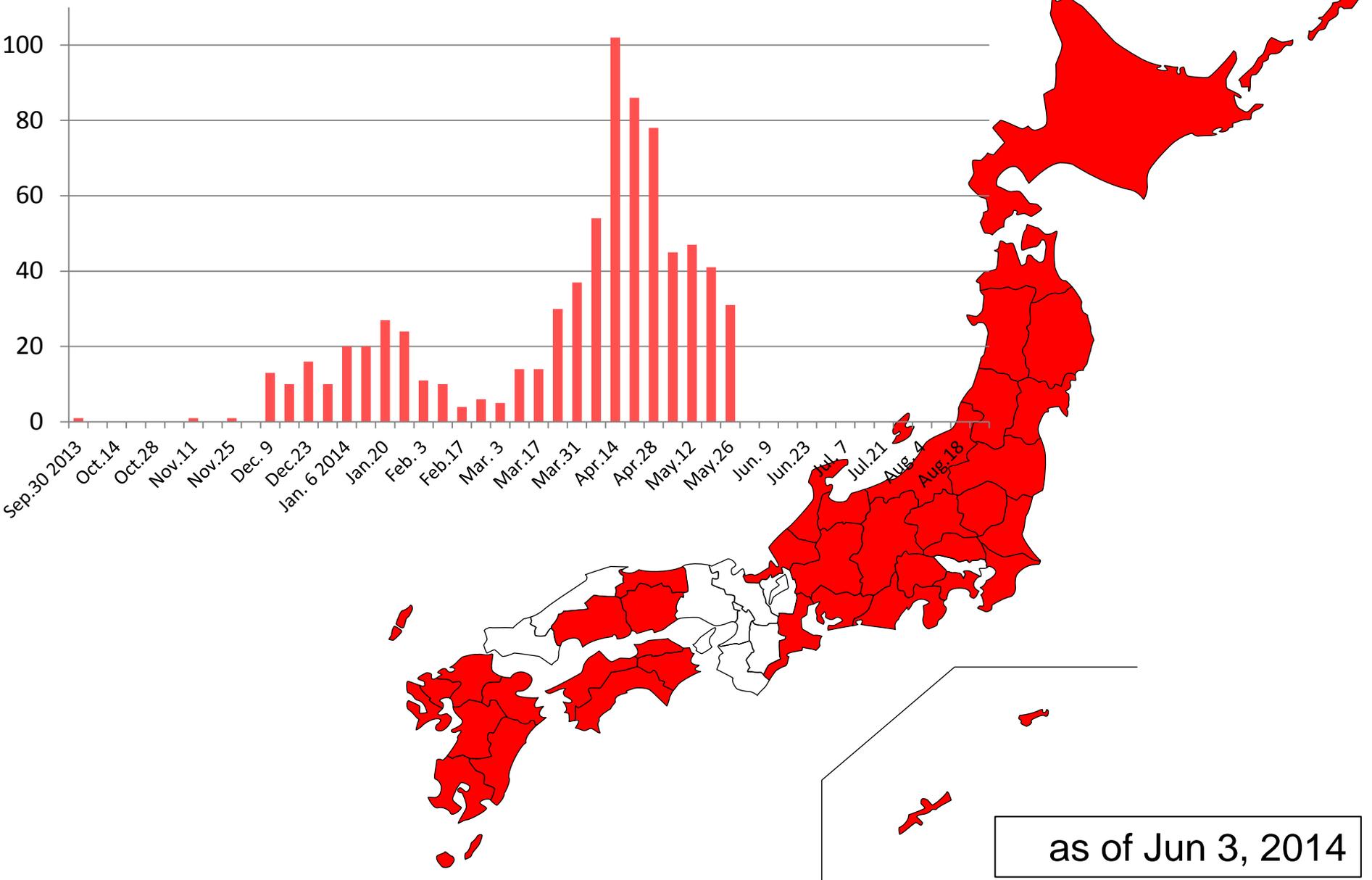
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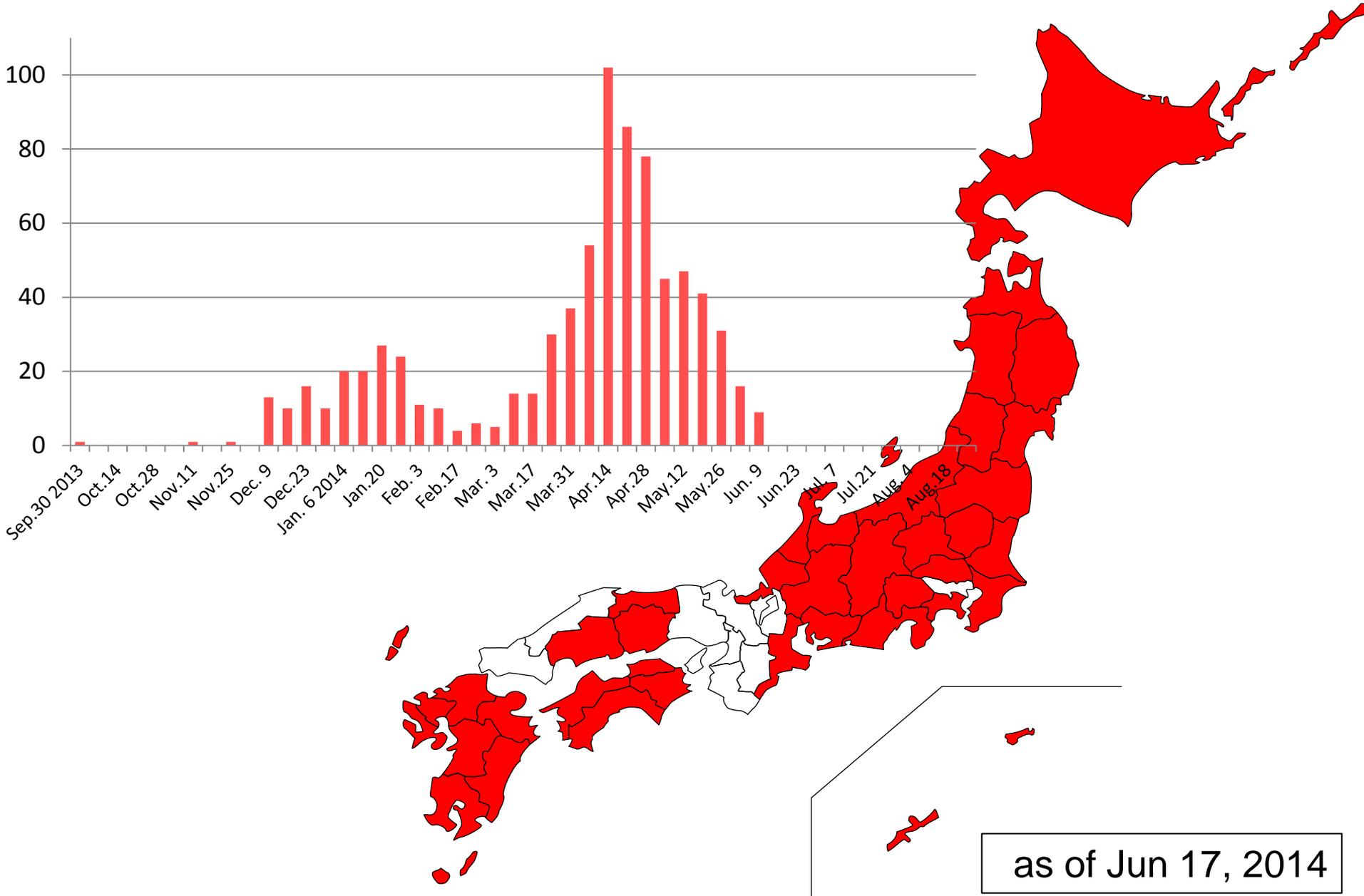


Confirmed cases of PED (Oct 2013 – Aug 2014)



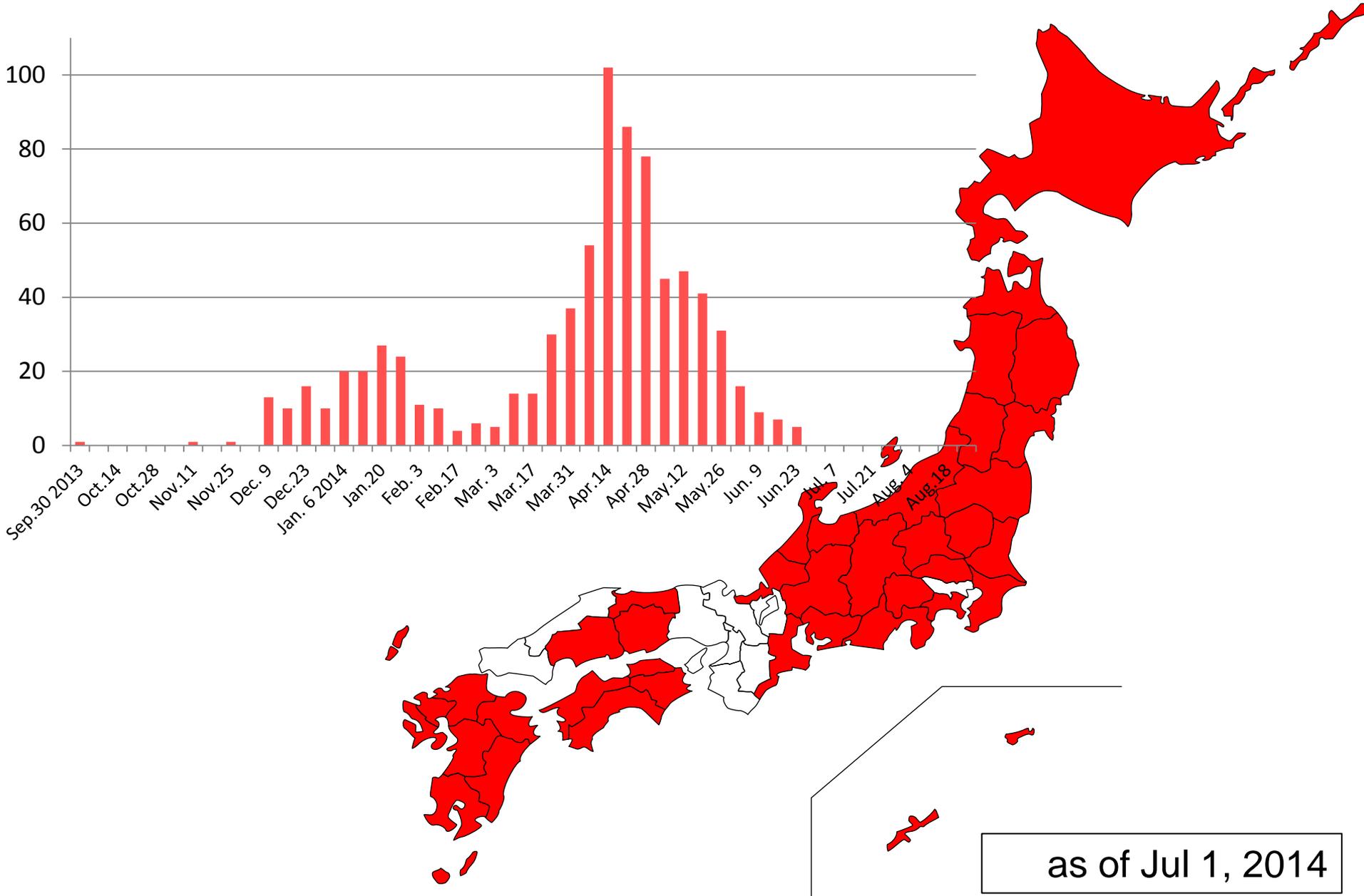
as of Jun 3, 2014

Confirmed cases of PED (Oct 2013 – Aug 2014)



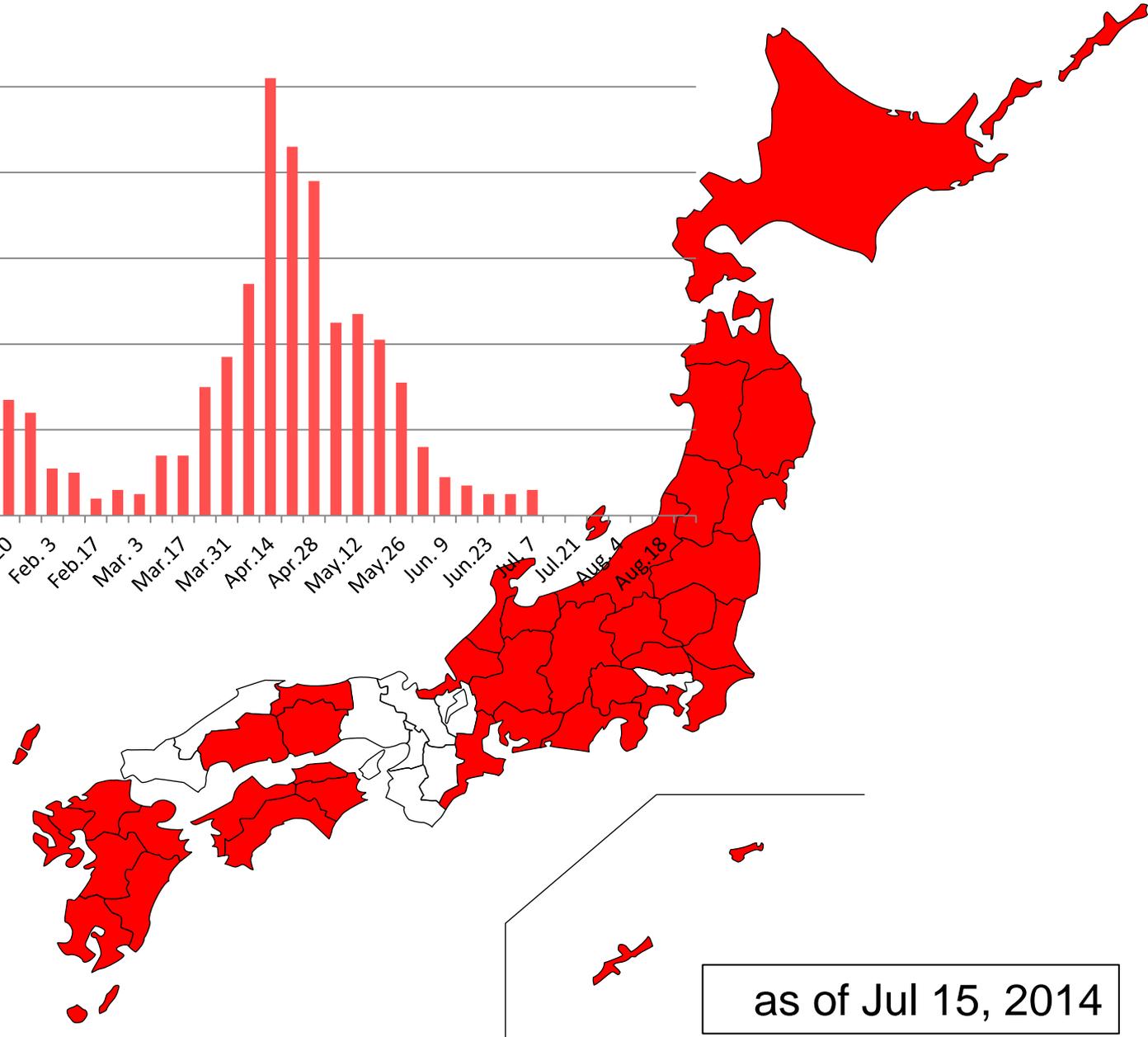
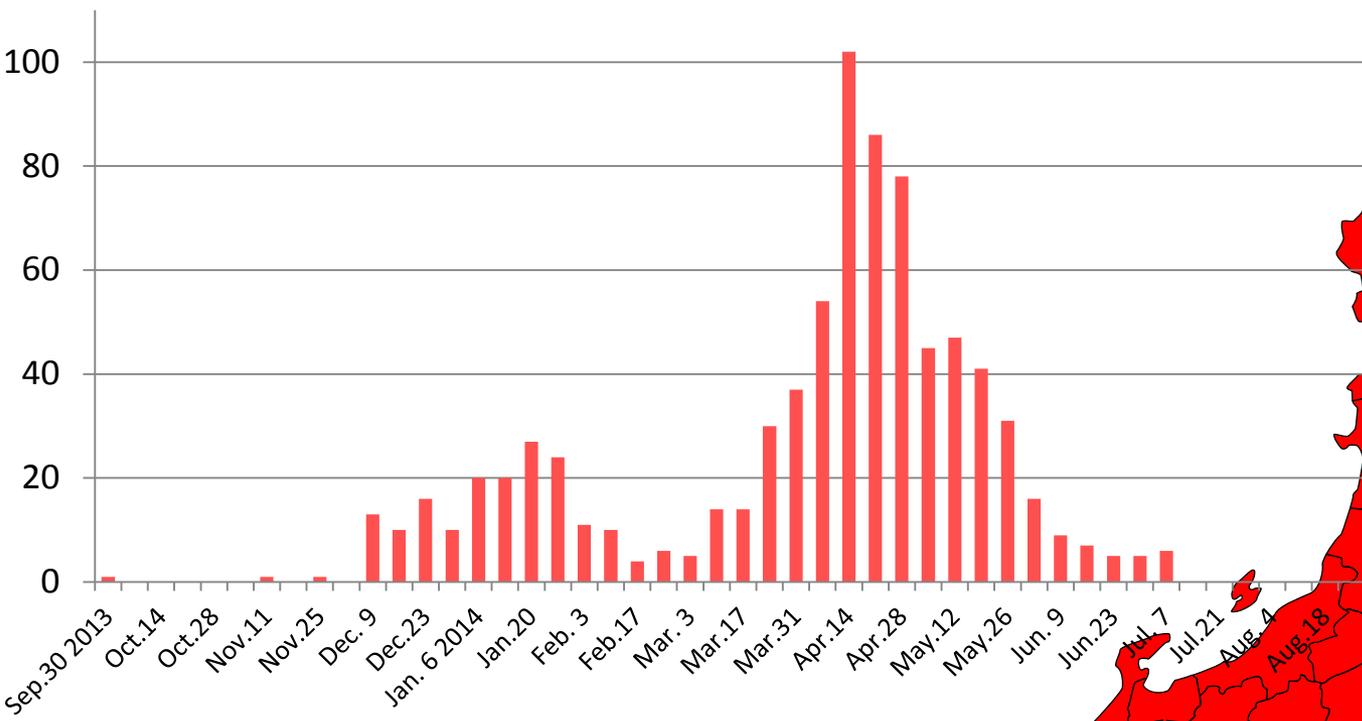
as of Jun 17, 2014

Confirmed cases of PED (Oct 2013 – Aug 2014)

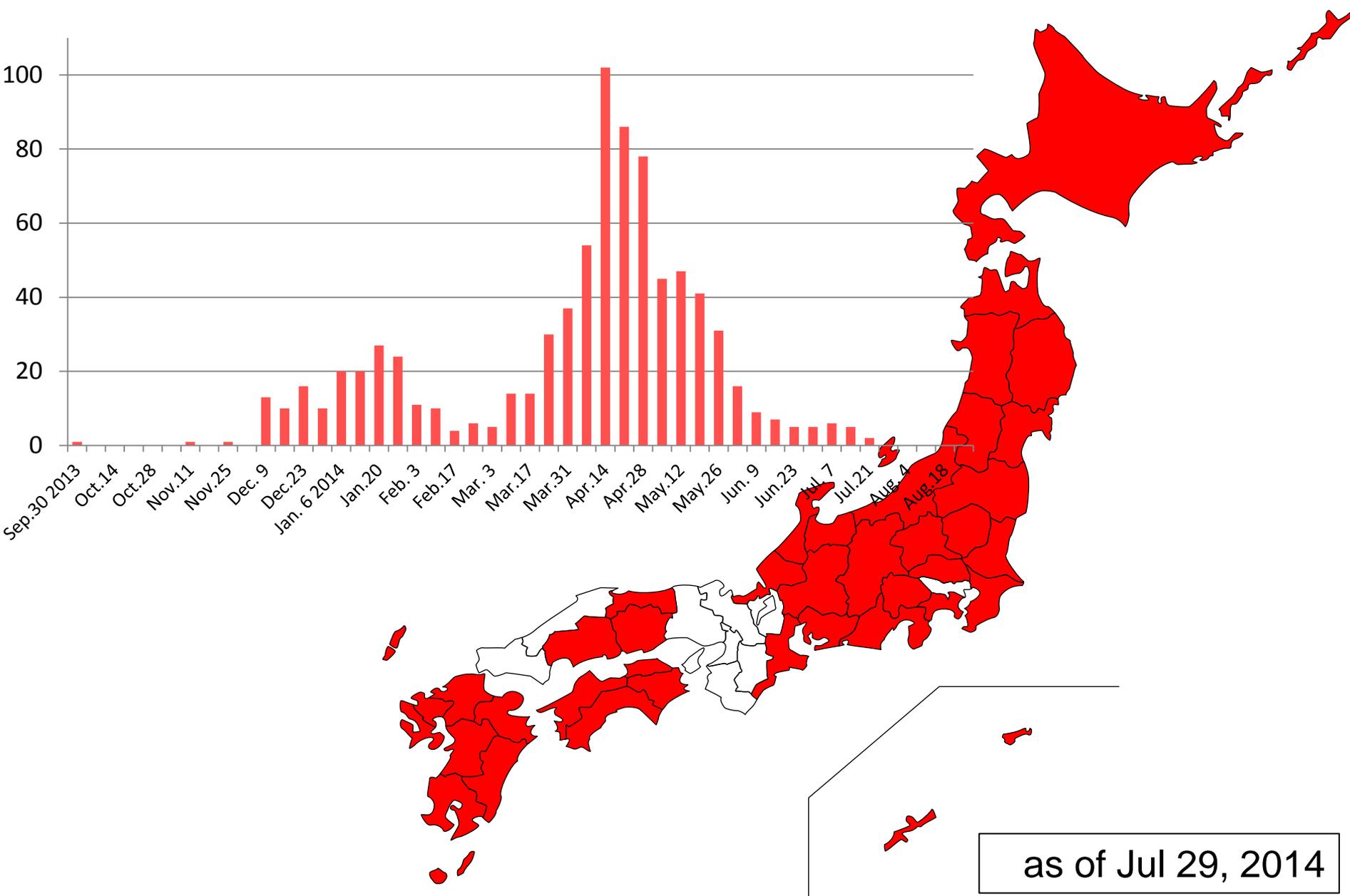


as of Jul 1, 2014

Confirmed cases of PED (Oct 2013 – Aug 2014)

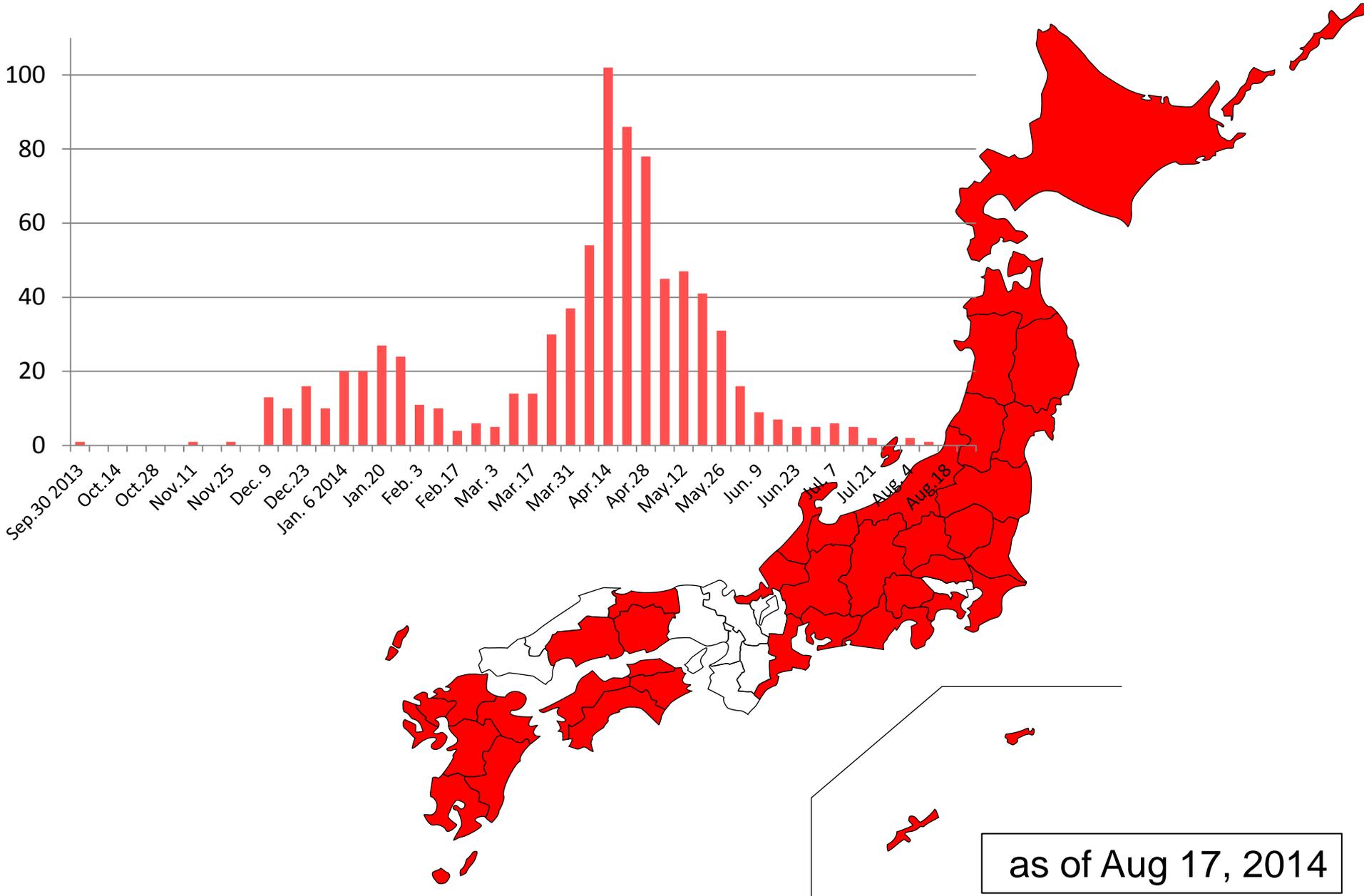


Confirmed cases of PED (Oct 2013 – Aug 2014)



as of Jul 29, 2014

Confirmed cases of PED (Oct 2013 – Aug 2014)



as of Aug 17, 2014

Summary of outbreaks

Affected prefectures : **38** / 47

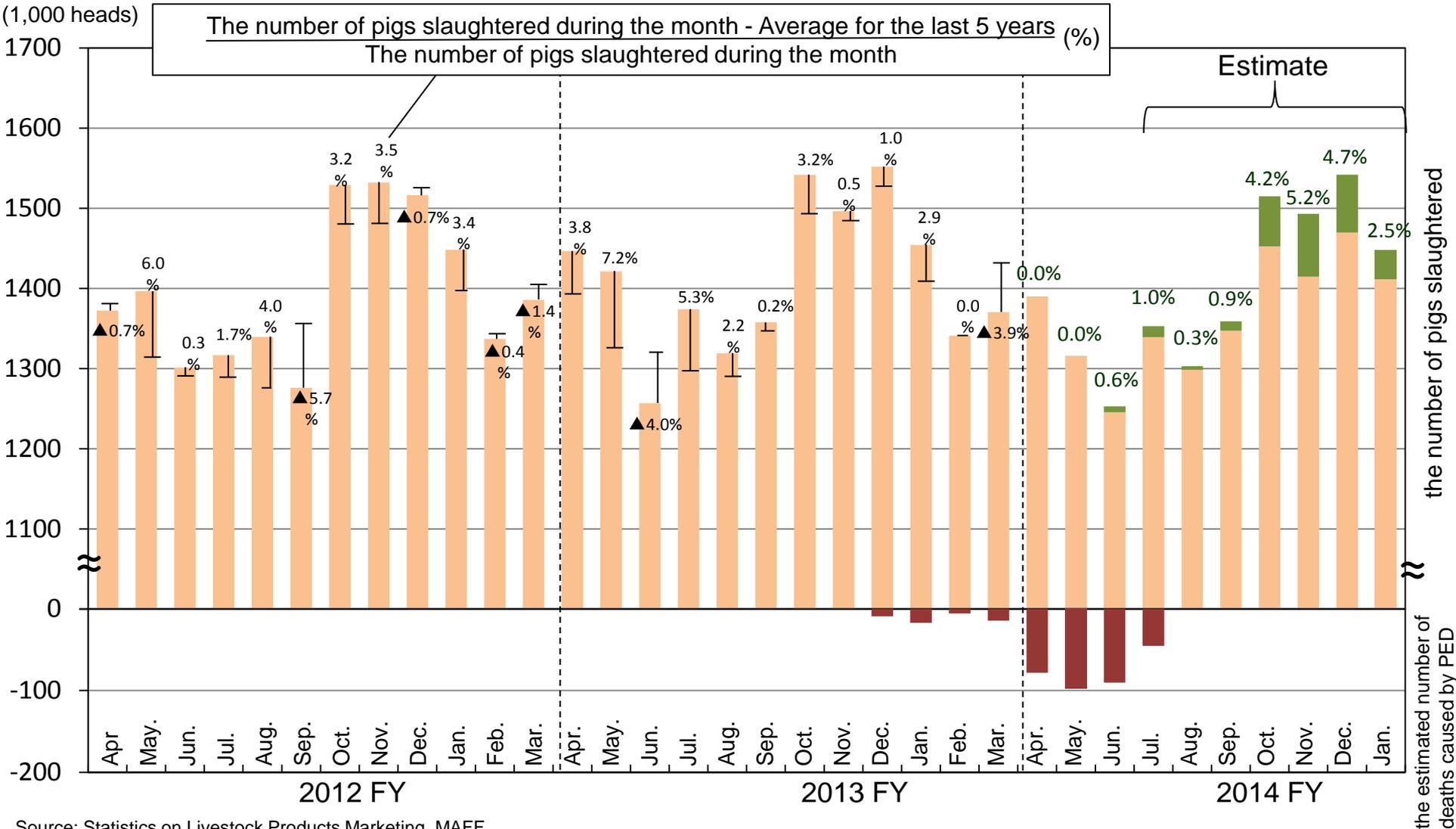
Affected farms : **817** / 5,270

Infected pigs : about **1,223,000** / 9,537,000

Death (*) : about **371,000** / 16,931,000

*Death : The total number of piglet death in affected farms.

Impact on the number of pigs to be slaughtered in Japan



Source: Statistics on Livestock Products Marketing, MAFF

Note 1) The estimated number of pigs to be slaughtered since July 2014 until December 2014 have already been published and the number in January 2015 is estimated in the same way.

Note 2) The estimated number of deaths caused by PED in each month is estimated that the total number of the death caused by PED is divided proportionally by the number of cases in each month.

Note 3) A decrease in number of pigs to be slaughtered since April 2014 is estimated that the number of deaths in the month that is 6 months before each month is multiplied by 80% that is the growth rate in growing pigs.

Note 4) Percentages in each month is that: (i) Before March 2014, an increase-decrease in the ratio the number of pigs slaughtered during the month of average for the last 5 years, (ii) After April 2014, a decrease in the ratio the estimated number of deaths caused by PED in each month of the estimated number of pigs to be slaughtered in each month.

Measures against PED

- Biosecurity practices strengthened
- Vaccination recommended
- Epidemiological investigations conducted

Biosecurity practices (1)

prevent introductions of the virus



Disinfection bath for vehicle wheel at entrance to a farm



Disinfection bath at entrance to a barn

Biosecurity practices (2)

prevent the virus transmission between farms



cleansing and disinfection of vehicle



Cleansing of livestock truck

Biosecurity practices (3)

prevent the virus transmission within regions



Installation of disinfection point

Measures taken for live pigs and semen

- **Shipping for slaughter from affected farms**

Pigs with clinical signs:
voluntary suspension of shipping

Pigs without clinical signs:
shipping at different time from pigs from unaffected farms

- **Semen from affected farms subjected to PCR test as a precautionary measure**

The virus genome was detected in a semen sample collected from affected farm.

Financial Support

To encourage regional control activities, financial support provided for disinfection agent and installing disinfection equipment at the entrance of farms and related facilities (slaughterhouses etc.)

3.5 million US dollar (100 yen = 1 US dollar)

PED vaccine

- Vaccination recommended to alleviate clinical symptoms and reduce loss of piglets
- The mortality rate be reduced from 80% to 30% (Experimental data with circulating strains provided by the manufactures)
- However, expected effect not appear under poor biosecurity

Stable supply of PED vaccine

Vaccination coverage remained low at around 10%

(400,000 dose in previous year)

Since Autumn 2013

Increased cases caused a temporary shortage of the vaccine supply

MAFF requested manufactures to increase production

FY 2013 (Apr-Mar) One million doses distributed

FY 2014 (Apr-Mar) Three million doses distributed

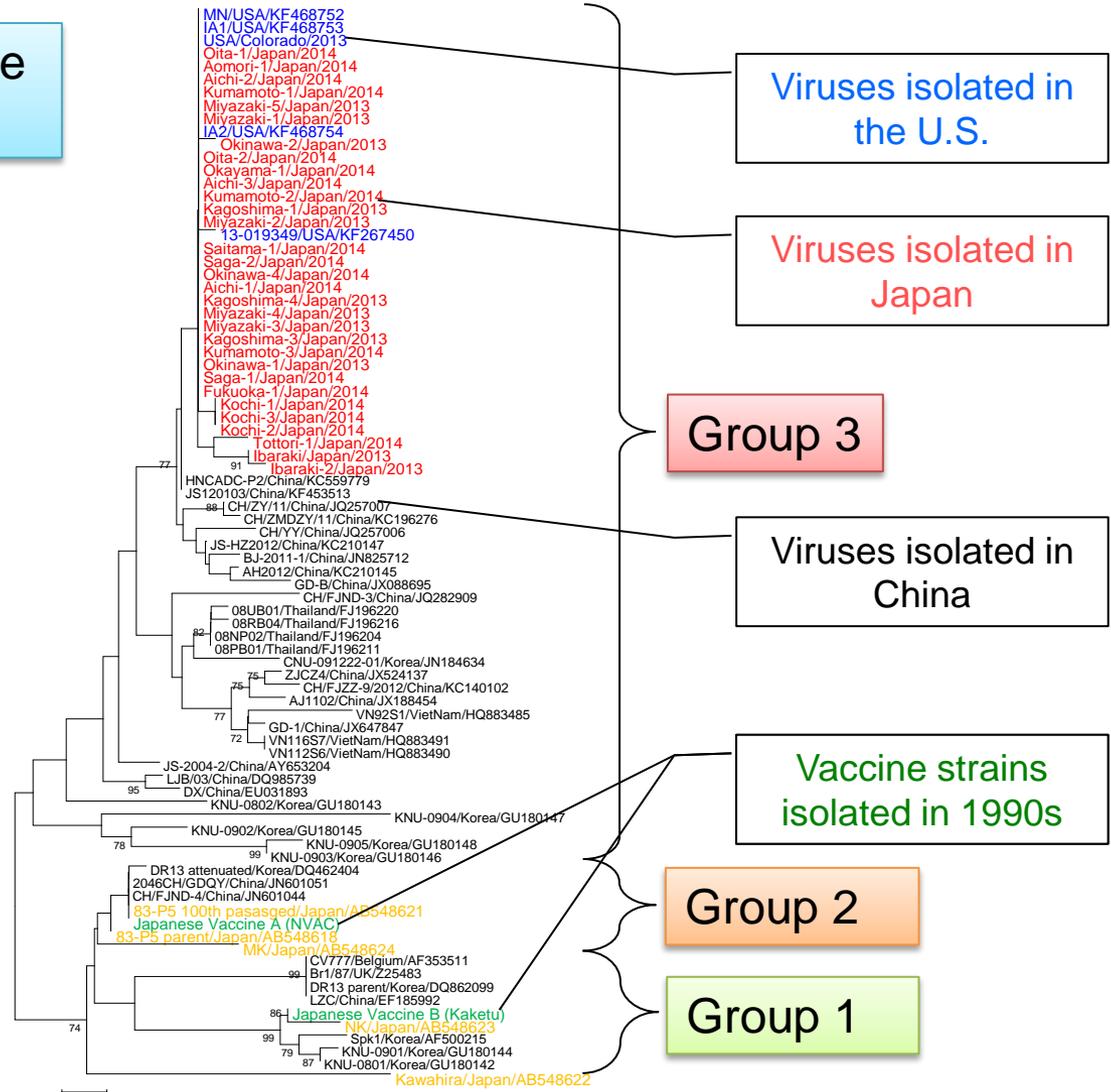
Epidemiological investigation

- Investigation has been conducted at every affected farms to identify any risk factors for introduction and transmission:
 - Introduction
 - Importation of live pig, feed including porcine blood plasma, semen, movement of people (including workers with travel history, visitors from affected countries), etc.
 - Transmission
 - Movement of animals, feed, semen, personnel, vehicles, equipment, manure handling, etc.
- Interim report to be published in September 2014

Characteristic of PED viruses isolated in Japan

- The viruses isolated in Japan were closely related to the strains prevalent in the U.S. and some Asian countries in recent years.

Molecular Phylogenetic Tree
(S1 gene)



Potential risk factors of introduction of PED virus from abroad to Japan

➤ Fecal samples from pigs with diarrhea

RT-PCR test : 53 Fecal and tissue samples from 2009 to 2012
Neutralization test : 49 Serum samples before 2009

Negative

➤ Serum samples from the U.S. pigs

Neutralization test : 438 serum samples from the U.S. pigs from 2010 to 2013 with ten positive results (one lot imported in May 2013)



Not observed increase of neutralizing antibody titers
Not observed clinical presentation of live pigs by follow-up check

➤ Porcine blood plasma from the U.S.

PCR test : 8 samples imported since Mar. 2014 with 7 positive results



Virus isolation : One sample tested out of 7 positive samples : Negative
Bioassay : 3 samples tested out of 7 positive samples : Negative

Potential risk factors in the transmission of PED virus in Japan (1)

- **Potential factors suggested include;**
 - animals; breeding, piglets for fattening
 - personnel / vehicles; feed distribution, shipping to slaughterhouses, fallen stock collection, facility repair etc.
 - others; manure facilities / spreading
- **Detailed investigation conducted at one affected public research center with high biosecurity concluded;**

the virus was likely to be introduced by wild animals such as mice, rats or protective clothing

Potential risk factors in the transmission of PED virus in Japan (2)

PCR test on environmental swab samples in affected farms

- **Tested positive** : walls & floors of affected pigpen, doorknob of pigpen, walls of office in farm, parking area, feed left in pigpen, drinking water, pre-fermented manure, sewage, doorknob / driving seat / gas pedal / tires of shipping truck, shipping truck box, working wear and high boots
- **Tested negative** : walls & floors of non-affected pigpen, post-fermented manure and steering wheel / floor mats of shipping truck

Under control of affected farm

- “Under control of affected farm” defined temporarily as a farm in which no clinical symptoms of pigs has been observed for more than two weeks
- In most cases, 1- 2 months needed until no clinical symptoms observed
- As of 8 August, 8% (out of 815 farms) are not under control
- Barriers to under control :
 - Difficulty with all-out farrowing house
 - Difficulty with workers in each pighouse
 - Lack of workers’ awareness of biosecurity
 - Inappropriate feedback exposure
 - Other diseases
 - Common facility and equipment in high-density pig farm area

Field survey of elimination of PED virus in affected farms

- **Investigated farm:**
Two farrow-to-finish operations
- **Methods:**
PCR test on rectal swab samples from finished pigs
- **Results:**
For both farms, negative test results around one month after clinical symptoms disappeared

Further actions

- Comprehensive guidelines to be available in September 2014:
 - sharing information among stakeholders
 - biosecurity measures (farms, visitors, slaughterhouses etc.)
 - regional collective activities (regular reporting, emergency disinfection)
 - vaccination
- An interim report of the epidemiological investigation to be published in September 2014
- Budget for next fiscal year to encourage vaccine manufactures to store emergency stocks for sharp demand increase as preparedness

Further actions

- Active surveillance for PEDv circulation
- Full genome sequencing, analysis of the molecular epidemiology of PEDv, experimental infection etc. by the National Institute of Animal Health (NIAH)
- Investigation for introduction of porcine deltacoronavirus (PDCoV) (NIAH)
- Research for more effective PED vaccine (NIAH)

Thank you for your attention

Reference material

Number of Pig Farm households and pigs in Japan on 1 February

	2009	2010	2011	2012	2013	2014	% Change 2014/2013
Number of pig farm households	6,890	...	6,010	5,840	5,570	5,270	94.6
Number of pigs (1,000heads)	9,899	...	9,768	9,735	9,685	9,537	98.5
For breeding pigs (female) (1,000heads)	937	...	902	900	900	885	98.4
Average number of pigs per farm	1,436.7	...	1,625.3	1,667.0	1,738.8	1,809.7	-
Average number of breeding pigs per farm	158.0	...	176.5	183.7	194.7	206.4	-

Source: Statistical Survey on Livestock, MAFF

* As 2010 was a Census reference year, surveys of pigs based on the "Statistical Survey on Livestock" were not conducted.

Number of Pig Slaughtered in Japan

Fiscal Year from Apr. to Mar. next year.	2009	2010	2011	2012	2013	2014 from Apr. to Jun.	% Change 2013/2012
Number of pig slaughtered (1,000heads)	17,077	16,621	16,508	16,751	16,931	3,955	101.1

Source: Statistics on Meat Marketing, MAFF

Animal Health System in Japan

International organizations (e.g. OIE)



MAFF

Animal Health Division,
Food Safety and Consumer
Affairs Bureau



Animal Quarantine Service
Head office, 7 branches, 17
sub-branches with 376 animal
quarantine officers
(as of Apr. 2014)



Prefectural Gov'ts

Livestock Hygiene Service
Centers

170 centers (including
disease diagnosis centers)
with 2,102 veterinarians
(as of Mar. 31, 2014)

(MHLW)

101 Meat Inspection Centers
with 2,580 veterinarians
(as of Mar. 31, 2013)



Producers

Beef cattle: 57,500 farms
(2.57 M head)
Dairy cattle: 18,600 farms
(1.40 M head)
Pigs: 5,270 farms
(9.54 M head)
Layers: 2,560 farms
(172 M hens)
Broilers: 2,380 farms
(136 M broilers)
(as of Feb. 1, 2014)



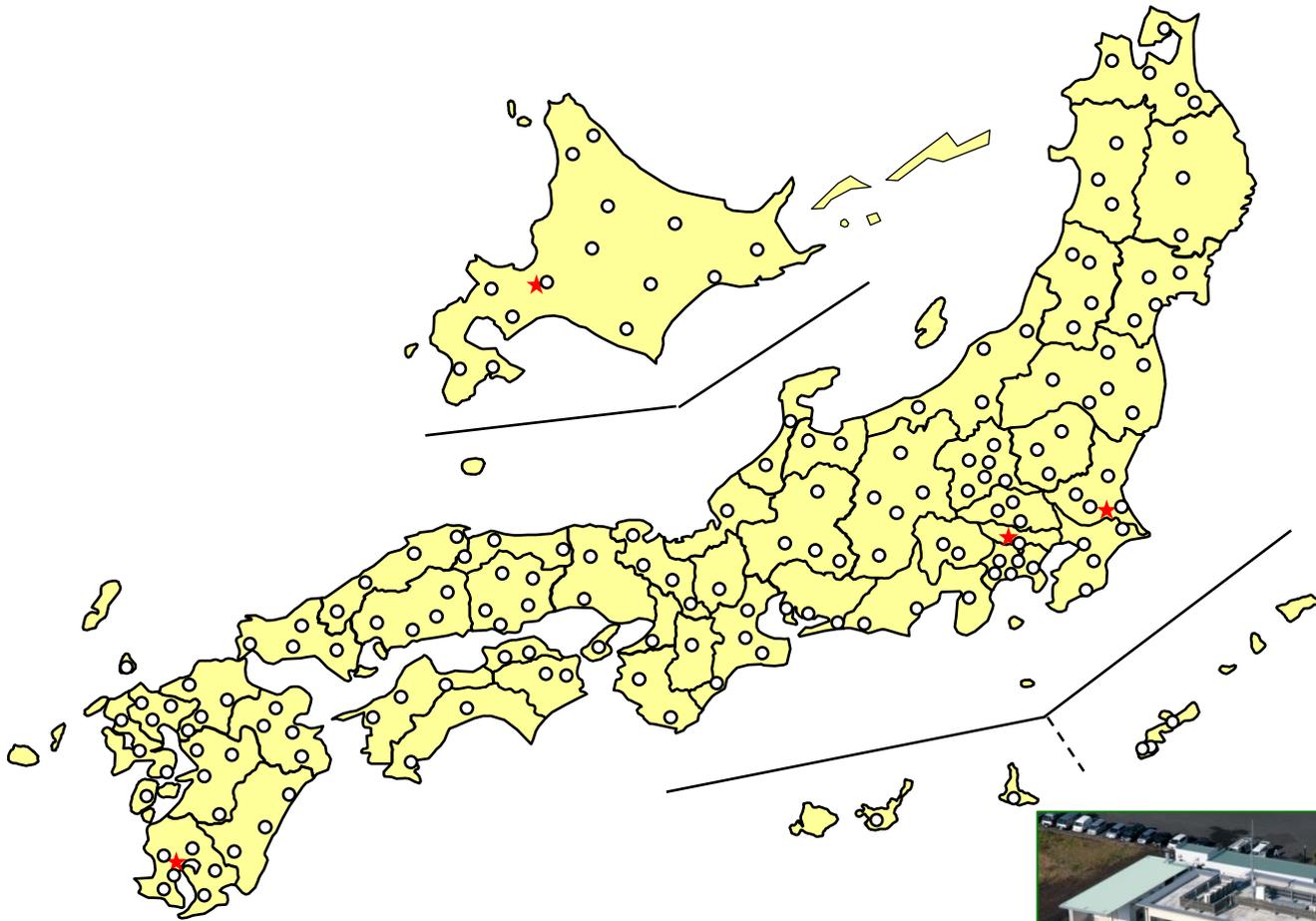
Industrial associations
for disease control



➤ National Veterinary Assay Laboratory
➤ National Institute of Animal Health



Location of major facilities for domestic animal health services



National Institute of Animal Health



Local Livestock Hygiene Service Centre



- ★ National Institute of Animal Health: 4
- Local Livestock Hygiene Service Centers: 171
(as of Mar 31, 2014)