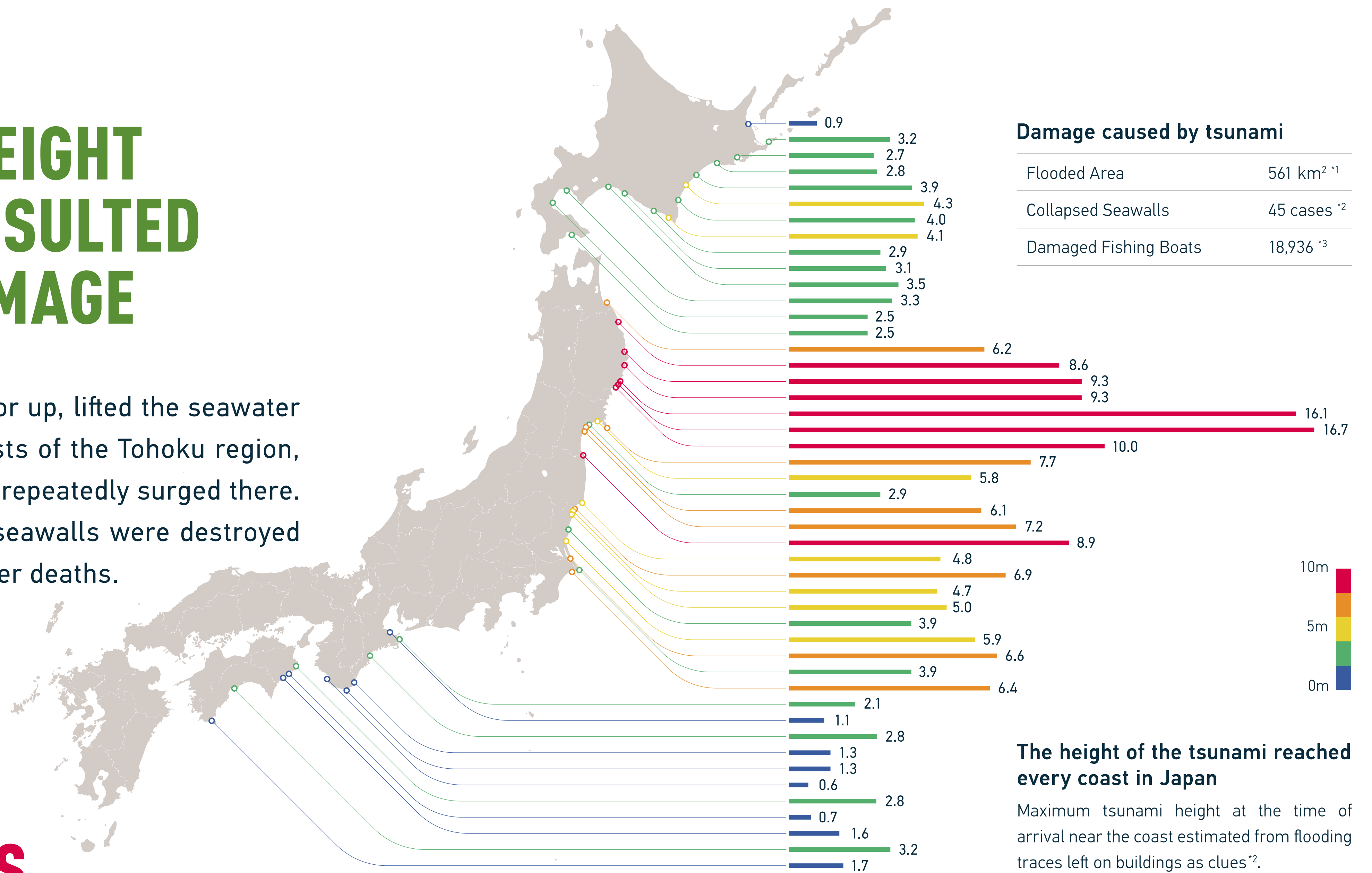


# 2 PREPARING FOR THE GREAT TSUNAMI

## FACT

### UNEXPECTED HEIGHT OF TSUNAMI RESULTED IN SERIOUS DAMAGE

The shifting in the bedrock violently pushed the seafloor up, lifted the seawater above it, and caused a tsunami. Along the Pacific coasts of the Tohoku region, the seawater drained away once and then the tsunami repeatedly surged there. The tallest tsunami was 16.7 m at the coast<sup>\*1</sup>. Many seawalls were destroyed and 90 % of the disaster's dead were estimated as water deaths.



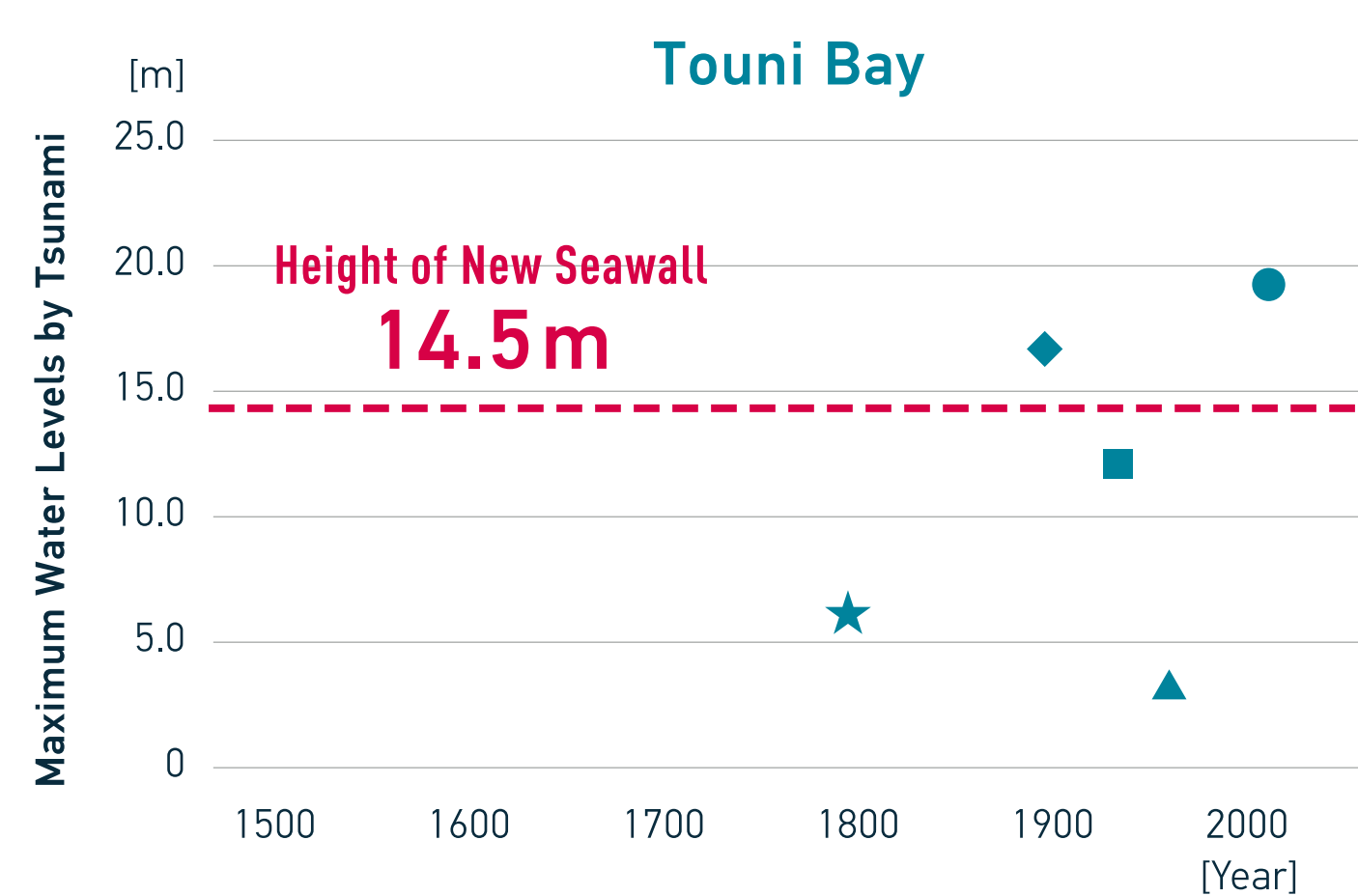
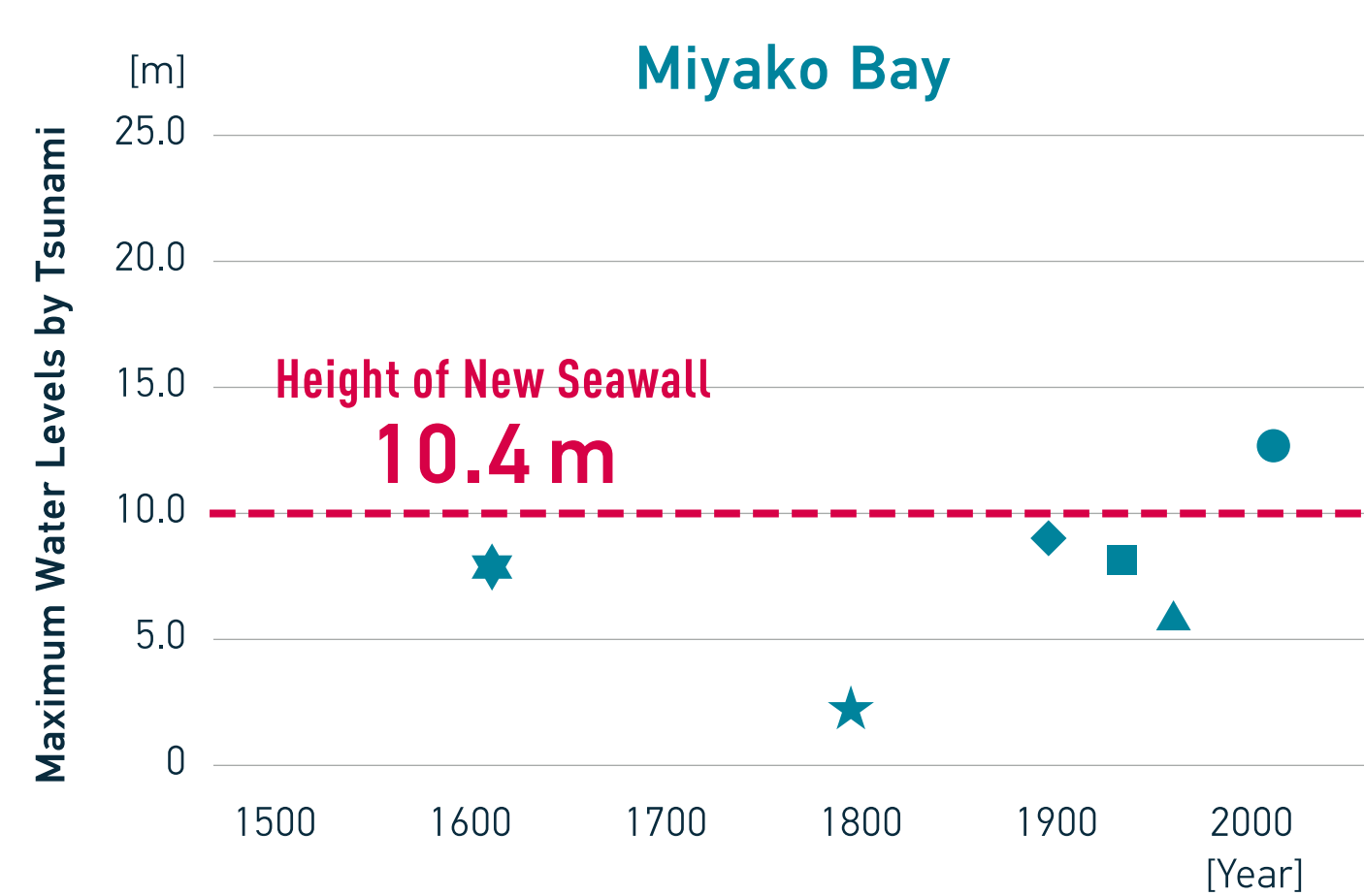
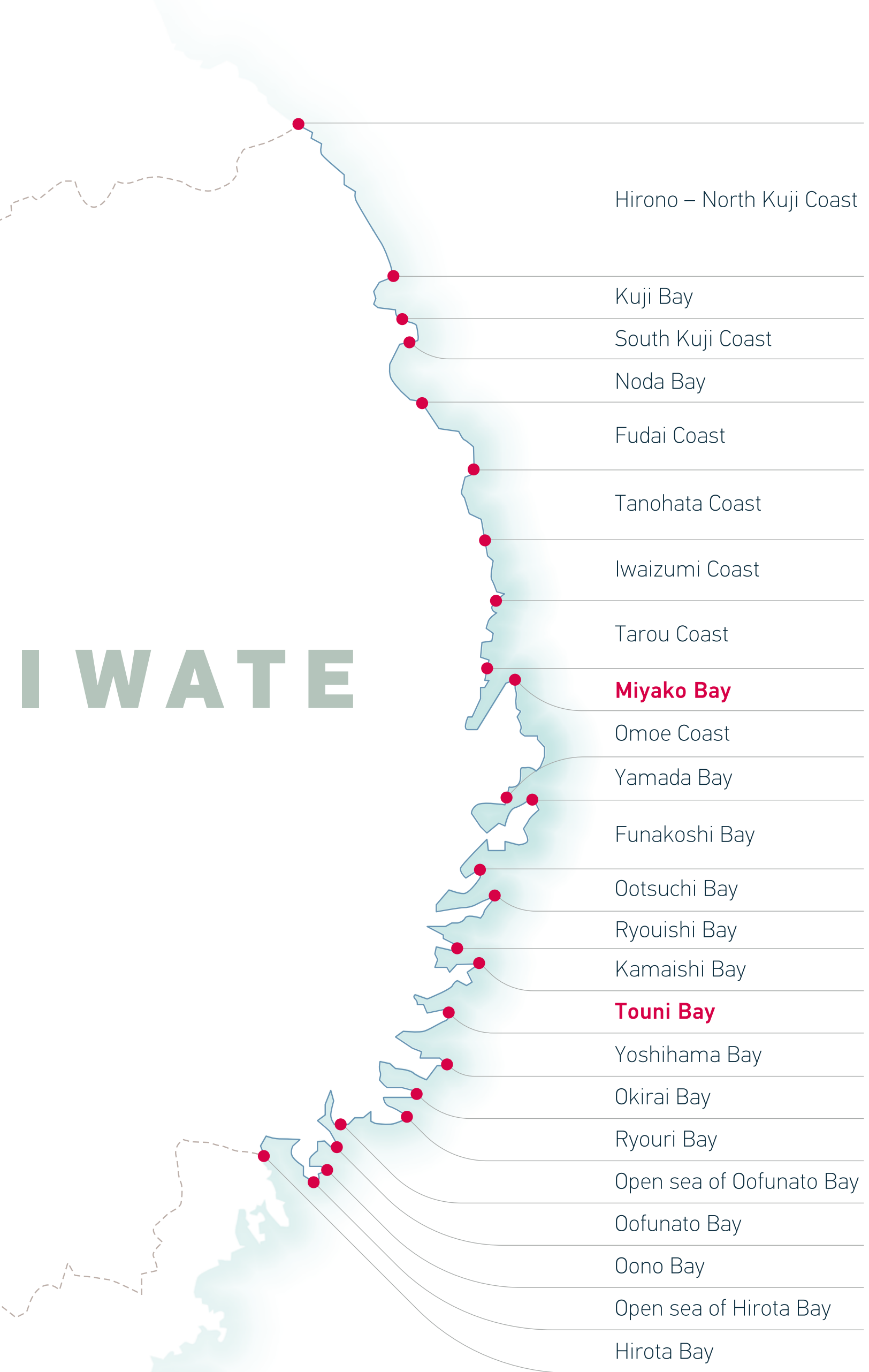
## OUR CHOICE

### BUILDING NEW SEAWALLS

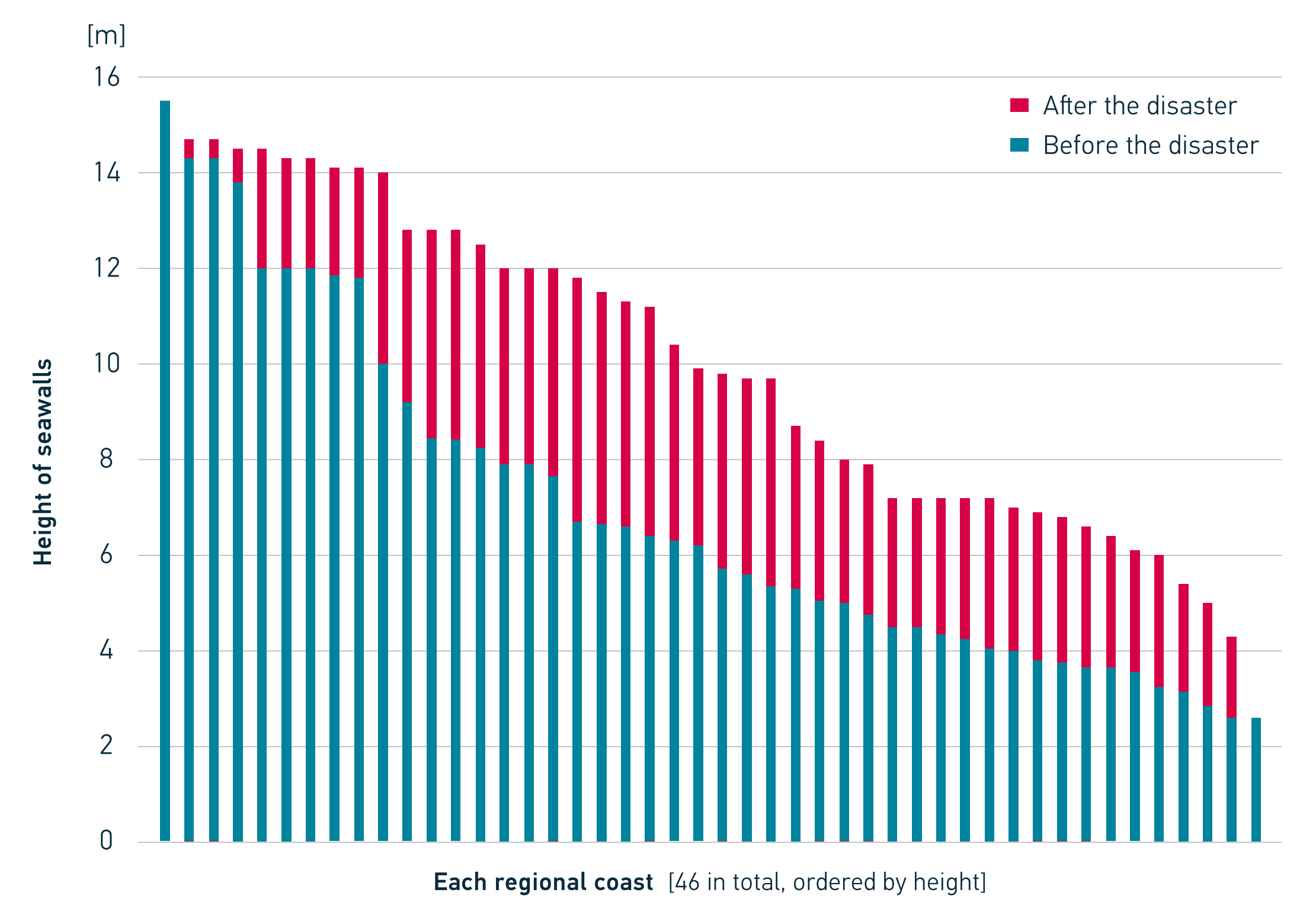
The Japanese government decided to construct new, tougher seawalls and created new guidelines on the height of seawalls, which should resist a major tsunami occurring over the next several decades to 100-and-several decades<sup>\*3</sup>. Records of previous earthquakes were reinvestigated and the heights of the tsunami were estimated with computer simulations. Thus, new seawalls' heights were determined in each coastal region, which are 0-8 m higher than previous ones<sup>\*4</sup>. While constructions of the seawalls are ongoing, there are concerns that a huge seawalls may cause a deterioration in landscape, decrease in the size of sand beaches, or destroy the ecological system, to name just a few<sup>\*5</sup>.



A seawall (7.5 m) in Ofunato Bay <sup>\*6</sup>



- ★ 1611 Keicyo Sanriku
- ★ 1793 Kansei Miyagi-oki
- ◆ 1896 Meiji Sanriku
- ▲ 1933 Syowa Sanriku
- ▲ 1960 Chile
- 2011 Great East Japan Earthquake



Comparison of the height of the seawalls before and after the earthquake  
The height of the new seawalls (red) and the average height of seawalls before the disaster (blue) at each regional coast in Iwate Prefecture and Miyagi Prefecture.

#### Method to determine the height of new seawalls in Iwate Prefecture

(Left) Twenty-four coastal areas, in each of which similar damage scales are expected if a tsunami hit. (Right) Estimates of the tsunami heights in two coastal regions due to past earthquakes, and determined heights of new seawalls.

## PAUSE FOR THOUGHT

We improved safety with higher seawalls, but another risk arose. What is the best compromise?

Reference <sup>\*1</sup> The 2011 Tohoku Earthquake Tsunami Joint Survey Group <sup>\*2</sup> Japan Meteorological Agency <sup>\*3</sup> Report of the Committee for Technical Investigation on Countermeasures for Earthquakes and Tsunamis Based on the Lessons Learned from the "2011 off the Pacific coast of Tohoku Earthquake" <sup>\*4</sup> Ministry of Land, Infrastructure, Transport and Tourism <sup>\*5</sup> For example, Yasuda, Y., "Earthquake reconstruction and breakwaters", 2015, p128. <sup>\*6</sup> Iwate Prefecture Government