

Calendar No. 237

114TH CONGRESS }
1st Session }

SENATE

{ REPORT
114-146

TSUNAMI WARNING, EDUCATION, AND
RESEARCH ACT OF 2015

R E P O R T

OF THE

COMMITTEE ON COMMERCE, SCIENCE, AND
TRANSPORTATION

ON

H.R. 34



SEPTEMBER 22, 2015.—Ordered to be printed

U.S. GOVERNMENT PUBLISHING OFFICE

49-010

WASHINGTON : 2015

SENATE COMMITTEE ON COMMERCE, SCIENCE, AND TRANSPORTATION

ONE HUNDRED FOURTEENTH CONGRESS

FIRST SESSION

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TSUNAMI WARNING, EDUCATION, AND RESEARCH ACT OF 2015

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Mr. THUNE, from the Committee on Commerce, Science, and
Transportation, submitted the following

R E P O R T

[To accompany H.R. 34]

The Committee on Commerce, Science, and Transportation, to which was referred the bill (H.R. 34) to authorize and strengthen the tsunami detection, forecast, warning, research, and mitigation program of the National Oceanic and Atmospheric Administration, and for other purposes, having considered the same, reports favorably thereon with an amendment (in the nature of a substitute) and recommends that the bill (as amended) do pass.

PURPOSE OF THE BILL

The purpose of H.R. 34, the Tsunami Warning, Education, and Research Act of 2015, is to reauthorize the National Oceanic and Atmospheric Administration (NOAA) Tsunami Forecasting and Warning Program, create standardization across the program, improve research, and foster increased communication with emergency managers and local weather forecast offices to disseminate appropriate tsunami warnings.

BACKGROUND AND NEEDS

A tsunami is a set of ocean waves caused by abrupt movement of the ocean floor, initiated by earthquakes, volcanic eruption, meteor strikes, or underwater landslides that can have devastating impacts to coastlines and coastal communities, sometimes within

minutes of a disturbance.¹ Tsunami waves can hit coastlines near where they are generated, or they can travel for thousands of miles, at speeds up to 600 miles per hour² and impact areas far from the location of the disturbance. Because disturbances are all unique, the resulting tsunami waves are also unique in height and direction, making timely forecasting difficult.³ The size and power of a tsunami is dependent on a number of variables including the height of the water column above the disturbance and the shape of the seafloor and shoreline where the waves reach land.⁴ Currently the uses of real-time, deep ocean detectors that can directly detect tsunami waves and data from seismic gauges combined with models are essential for early detection. These relatively recent developments, in conjunction with continuing community education, have been shown to reduce the loss of life.⁵

The Sumatra, Indonesia earthquake that struck on December 26, 2004, with a magnitude of 9.2, created a catastrophic tsunami throughout the Indian Ocean region.⁶ The earthquake was the third largest in the world since 1900, and the resulting tsunami killed more people than any other tsunami in recorded history, with 227,989 dead or missing and an estimated \$10 billion in losses.⁷ A panel of experts surveyed almost all of the Indian Ocean region countries affected by the tsunami to measure the runup height, which is the difference between the elevation of maximum tsunami inundation and the sea level at the time of the tsunami.⁸ Along the northwest coast of Sumatra, runup heights were measured at 65-131 feet with a maximum of 167 feet.⁹ Scientists assessed the damage from the tsunami disaster and found that few, if any, systems existed in the Indian Ocean to monitor tsunami dangers.

In the wake of such a disaster, Congress began to discuss the circumstance surrounding the Indian Ocean tsunami and the international capabilities for tsunami detection and warning. In 2006, Congress passed the Tsunami Warning and Education Act (P.L. 109-424) that directed the Administrator of NOAA to operate a tsunami detection, forecasting, and warning program for the Pacific and Arctic Ocean regions and for the Atlantic Ocean, Caribbean Sea, and Gulf of Mexico region. The legislation also directed NOAA to establish a tsunami hazard mitigation program to improve preparedness of at-risk areas in the United States.

On Friday, March 11, 2011, a 9.0 magnitude earthquake struck off Japan's northeast coast triggering a devastating tsunami in

¹"The Tsunami Story," National Oceanic and Atmospheric Administration, accessed March 18, 2015, at http://www.tsunami.noaa.gov/tsunami_story.html.

²U.S. Congress, Senate Committee on Commerce, Science, and Transportation, Tsunami Preparedness Act, report to accompany S. 50, 109th Cong., 1st sess., S.Rept. 109-59 (Washington, DC: GPO, 2004), pp. 1-6.

³"The Tsunami Story," National Oceanic and Atmospheric Administration, accessed March 18, 2015, at http://www.tsunami.noaa.gov/tsunami_story.html.

⁴U.S. Congress, Senate Committee on Commerce, Science, and Transportation, Tsunami Preparedness Act, report to accompany S. 50, 109th Cong., 1st sess., S.Rept. 109-59 (Washington, DC: GPO, 2004), pp. 1-6.

⁵"The Tsunami Story," National Oceanic and Atmospheric Administration, accessed March 18, 2015, at http://www.tsunami.noaa.gov/tsunami_story.html.

⁶CRS Report RL32739, Tsunamis: Monitoring, Detection, and Early Warning Systems, by Wayne Morrissey.

⁷National Oceanic and Atmospheric Administration, National Geophysical Data Centers, "December 26, 2004 Sumatra, Indonesia Earthquake and Tsunami – Tenth Anniversary Update," accessed March 18, 2014, at http://www.ngdc.noaa.gov/hazard/data/publications/2004_1226.pdf.

⁸Ibid.

⁹Ibid.

parts of the coastal regions of Japan closest to the earthquake. The tsunami traveled across the Pacific Ocean and triggered tsunami warnings for coastal areas of Hawaii, Guam, the Commonwealth of the Northern Marianas, American Samoa, Alaska, and California.¹⁰ According to the International Tsunami Information Center, which operates under the International Oceanographic Commission (IOC), the Japan Meteorological Agency (JMA) issued a tsunami warning three minutes after the earthquake hit, and the first tsunami wave reached the Japan coastline about 15 minutes after.¹¹ However, the magnitude of the quake and estimated tsunami heights in the initial warning were significantly underestimated.¹² The massive tsunami, with a measured runup height of up to 52 feet that struck Japanese coastal areas, caused severe damage with the number of deaths and missing people reaching around 20,000.¹³ The IOC has noted that the warning systems in place identified the location of the earthquake to allow for early warnings, however, an evaluation of the system a few years after the event has identified a series of lessons learned to improve the JMA's tsunami warning system.¹⁴ The JMA has since placed high priority on education and awareness efforts, in addition to some changes in the warning system to use qualitative expressions such as High and Huge, which correspond to quantitative measurements of estimated wave heights over 9 feet and over 16 feet, respectively.¹⁵ The JMA has also enhanced the observation facilities with satellite-link telecommunication equipment as backup and has installed three Deep-ocean Assessment and Reporting of Tsunami (DART®) buoys off the Pacific coast of the Tohoku district.¹⁶

Scientists at NOAA's tsunami warning centers were analyzing seismic data and running models as the events unfolded following the earthquake near Japan. Using sea-level measurements from the DART® buoys and tide gauges, they were able to refine predictions as the tsunami approached, and had the benefit of time to respond.¹⁷ The warnings and alerts NOAA was able to provide enabled identification of at-risk areas, evacuations, and road closures. Boats along the West Coast were moved out to open water to minimize damage.¹⁸

To provide the earliest possible alert, initial warnings are normally based on seismic data alone.¹⁹ Based on maps the U.S. Geological Survey released in 2008, more weight was given to the probability of a catastrophic magnitude 9.0 earthquake occurring along the Cascadia subduction zone, which has the potential to generate a destructive tsunami along the coast of Washington, Oregon, and northern California. These waves could reach the coast of Oregon

¹⁰ CRS Report R41686, U.S. Tsunami Programs: A Brief Overview, by Peter Folger.

¹¹ *Ibid.*

¹² Japan Meteorological Agency, "Lessons learned from the tsunami disaster caused by the 2011 Great East Japan Earthquake and improvements in JMA's tsunami warning system," accessed March 19, 2015, at http://www.data.jma.go.jp/svd/eqev/data/en/tsunami/LessonsLearned_Improvements_brochure.pdf.

¹³ *Ibid.*

¹⁴ *Ibid.*

¹⁵ *Ibid.*

¹⁶ *Ibid.*

¹⁷ National Oceanic and Atmospheric Administration, "Japan's 'harbor wave' – The tsunami one year later," accessed March 19, 2015, at http://www.noaa.gov/features/03_protecting/japantsunami_oneyearlater.html.

¹⁸ *Ibid.*

¹⁹ CRS Report R41686, U.S. Tsunami Programs: A Brief Overview, by Peter Folger.

and Washington in less than an hour, possibly in tens of minutes.²⁰ In addition, massive submarine landslides and strong earthquakes have historically occurred along the Puerto Rican Trench creating the potential for a destructive tsunami along the Atlantic and Caribbean Basins.²¹

NOAA's National Weather Service (NWS) operates two tsunami warning centers responsible for monitoring Earth's oceans for earthquakes and tsunamis. The centers, which are staffed 24 hours a day, 7 days a week, forecast tsunami impacts and issue alerts to emergency managers and the public. The Pacific Tsunami Warning Center (PTWC) is located in Hawaii and serves Hawaii and the U.S. Pacific territories and is the primary international warning center for both the Pacific Ocean and Caribbean Basin.²² The PTWC was established in 1949 in response to the 1946 tsunami generated in the Aleutian Islands that devastated Hilo, Hawaii almost five hours later killing more than 150 people, injuring at least 161 others, and causing approximately \$25 million in damages.²³ The National Tsunami Warning Center (NTWC) is located in Alaska and serves Canada, Puerto Rico, the Virgin Islands, and all U.S. coastal States, except Hawaii. The NTWC was established in 1967 a few years after a 9.2 magnitude earthquake struck Alaska and caused localized tsunami damages.²⁴

Scientists at both warning centers monitor seismic data, sea level gauges, and data buoys 24 hours a day to determine whether a tsunami has been generated and where it might hit land.²⁵ In the event that either tsunami center is disabled or otherwise unable to issue any of its critical products, the other tsunami center has authority and capability to issue warnings for all areas covered by the Tsunami Forecasting and Warning Program and can thus act as backup.²⁶ In addition, the proximity of the tsunami warning center location has no effect on the speed of the warning. Initial warning times are fully dependent on how quickly seismic wave analyses can be performed and the seismic sensing density near the location of the event.²⁷

The three main categories funded within NOAA's Tsunami Forecasting and Warning Program are warning, mitigation, and research. The warning component captures activities of the tsunami warning centers and DART® network; mitigation is captured in the National Tsunami Hazards Mitigation Program (NTHMP) which works with States and emergency managers to assist with planning and developing coastal inundation maps; and research is mostly conducted by the Pacific Marine Environmental Laboratory and the National Buoy Center.²⁸ After the 2004 Indian Ocean tsunami,

²⁰ CRS Report RL33861, Earthquakes: Risk, Detection, Warning, and Research, by Peter Folger.

²¹ CRS Report RL34506, Tsunamis Detection and Warnings for the United States, by Wayne Morrissey.

²² CRS Report R41686, U.S. Tsunami Programs: A Brief Overview, by Peter Folger.

²³ G.A. Macdonald, F.P. Shepard, and D.C. Cox, "The tsunami of April 1, 1946, in the Hawaiian Islands," *Pacific Science* (January 1947), pp. 21-37.

²⁴ CRS Report R41686, U.S. Tsunami Programs: A Brief Overview, by Peter Folger.

²⁵ U.S. Congress, Senate Committee on Commerce, Science, and Transportation, *Tsunami Preparedness Act*, report to accompany S. 50, 109th Cong., 1st sess., S.Rept. 109-59 (Washington, DC: GPO, 2004), pp. 1-6.

²⁶ National Oceanic and Atmospheric Administration, National Weather Service Instruction 10-701, March 28, 2012, p. 7, at <http://www.nws.noaa.gov/directives/sym/pd01007001curr.pdf>.

²⁷ Email correspondence with Matthew Borgia, NOAA Congressional Liaison for Weather, and NOAA Tsunami Program Director, March 24, 2015.

²⁸ CRS Report R41686, U.S. Tsunami Programs: A Brief Overview, by Peter Folger.

funding increased from around \$27 million in fiscal year (FY) 2005 to \$42 million in FY 2009.²⁹ The program received \$26.4 million in FY 2013, \$31.3 million in FY 2014, and \$31.4 million in FY 2015. The FY 2016 President's Budget proposes top-line tsunami program funding at \$25.4 million. For FY 2016 NOAA proposes a decrease of \$6 million from FY 2015 enacted to terminate the NWS contribution toward the NTHMP grant program. Through the NTHMP, this grant program supports local education, awareness, and inundation and evacuation map development.³⁰ NOAA is not seeking to terminate the NTHMP and will continue to fund critical tsunami program components.³¹

The PTWC and NTWC monitor coastal water-level data through both tide-level gauges and data from NOAA's DART® network of buoys.³² Since the Sumatra tsunami of December 2004, NOAA has made significant upgrades to the U.S. tsunami warning system, to include: installing 49 new or upgraded tide gauges; installing or upgrading 8 seismic stations; and expanding the network of DART® buoys from 6 to 39. The original array of 6 DART® buoys were exclusively in the eastern Pacific, and now the array of 39 expands from the western Pacific to the Atlantic, located at sites with a history of generating tsunamis.³³

SUMMARY OF PROVISIONS

H.R. 34 (as amended) would reauthorize, enhance, and modernize NOAA's Tsunami Forecasting and Warning Program. The bill would require the program, to the degree practicable, to maintain not less than 80 percent of the DART® buoy array in operational status. The program would enhance and modernize the current tsunami system and develop uniform standards and guidelines for mapping, modeling, education and outreach. Additionally, the Tsunami Warning Centers areas of responsibility are geographically defined. The centers would be required to establish uniform operating procedures, including software applications, checklists, and products. Supercomputing resources would be available to run computer models needed for the tsunami warning system.

H.R. 34 would also require the Administrator of NOAA to work with the Federal Emergency Management Agency to conduct community-based tsunami hazard mitigation to improve readiness and resiliency. Not later than one year after enactment, a report would be required to be submitted to Congress that addresses national efforts in effect on the day before the date of enactment of this Act that support rapid emergency response following a tsunami event in the United States.

LEGISLATIVE HISTORY

H.R. 34 was introduced in the House of Representatives by Representative Bonamici. The House of Representatives passed H.R.

²⁹ *Ibid.*

³⁰ National Oceanic and Atmospheric Administration FY 2016 Congressional Budget Justification. Accessed March 20, 2015 at http://www.corporateservices.noaa.gov/nbo/fy16_bluebook/NOAA_FY16_CJ_508compliant_v2.pdf.

³¹ *Ibid.*

³² CRS Report R41686, U.S. Tsunami Programs: A Brief Overview, by Peter Folger.

³³ National Oceanic and Atmospheric Administration, "NOAA Launches Final Two Buoys to Complete U.S. Tsunami Warning System," press release, March 10, 2008, at http://www.noaa.gov/stories2008/20080310_buoy.html.

34 by voice vote on January 7, 2015. On January 8, 2015, it was received in the Senate, read twice, and referred to the Committee on Commerce, Science, and Transportation. On February 26, 2015, the Committee met in open Executive Session and, by a voice vote, ordered H.R. 34 reported with an amendment in the nature of a substitute.

Changes in the substitute included requirements for at least 80 percent of the DART® buoy array to be operational, for tsunami warning centers to use data from the NOAA Integrated Ocean Observing System, for use of the NWS's existing mass communication tools to deliver tsunami warnings, and several modifications to the NTHMP. The Committee supported the substitute amendment that maintained congressional notification requirements, as well as the NTHMP's ability to provide maps of evacuation areas and evacuation routes that had been eliminated in the House-passed bill. In addition, it eliminated a requirement that NOAA conduct a pilot project for near field tsunami forecast development.

The substitute incorporated an amendment from Senator Schatz, which would expand the types of data the Tsunami Forecasting and Warning Program should include in model validation, allow the NTHMP to provide assistance for evaluating the effect of tsunami currents on the foundations of closely-spaced, coastal high-rise structures, encourage the colocation of tsunami sensors on marine telecommunications cables, and allow for the formation of regional coastal risk management coalitions of Federal, State, local, and tribal governments, community groups, academic institutions, and non-governmental groups.

ESTIMATED COSTS

In accordance with paragraph 11(a) of rule XXVI of the Standing Rules of the Senate and section 403 of the Congressional Budget Act of 1974, the Committee provides the following cost estimate, prepared by the Congressional Budget Office:

H.R. 34—Tsunami Warning, Education, and Research Act of 2015

Summary: H.R. 34 would amend and reauthorize the Tsunami Warning and Education Act. The bill would authorize appropriations totaling \$162 million over the 2016–2021 period for the National Oceanic and Atmospheric Administration (NOAA) to carry out activities under that act. Based on information from NOAA and assuming appropriation of the authorized amounts, CBO estimates that implementing the legislation would cost \$121 million over the 2016–2020 period and \$41 million after 2020. Because enacting H.R. 34 would not affect direct spending or revenues, pay-as-you-go procedures do not apply.

H.R. 34 contains no intergovernmental or private-sector mandates as defined in the Unfunded Mandates Reform Act (UMRA).

Estimated cost to the Federal Government: The estimated budgetary impact of H.R. 34 is shown in the following table. The costs of this legislation fall within budget function 300 (natural resources and environment).

	By fiscal year, in millions of dollars—					
	2016	2017	2018	2019	2020	2016–2020
CHANGES IN SPENDING SUBJECT TO APPROPRIATION						
Authorization Level	27	27	27	27	27	135
Estimated Outlays	18	23	26	27	27	121

Basis of estimate: For this estimate, CBO assumes that the legislation will be enacted near the end of 2015 and that the authorized amounts will be appropriated for each fiscal year. Estimated outlays are based on historical spending patterns for similar activities.

H.R. 34 would authorize the appropriation of \$27 million a year over the 2016–2021 period for NOAA to maintain tsunami warning centers, support efforts by local governments to mitigate the effects of tsunamis, and fund research related to tsunamis. In 2015, NOAA received appropriations totaling \$31 million to carry out those activities. Based on information provided by the agency, CEO estimates that implementing the bill would cost \$121 million over the 2016–2020 period and \$41 million after 2020, assuming appropriation of the authorized amounts.

Pay-As-You-Go considerations: None.

Intergovernmental and private-sector impact: H.R. 34 contains no intergovernmental or private-sector mandates as defined in UMR. Coastal state, local, and tribal governments could benefit from programs and assistance authorized in the bill. Any costs they incur, including matching contributions, would result from participation in voluntary federal programs.

Estimate prepared by: Federal costs: Jeff LaFave; Impact on state, local, and tribal governments: Jon Sperl; Impact on the private sector: Amy Petz.

Estimate approved by: Theresa Gullo, Assistant Director for Budget Analysis.

REGULATORY IMPACT

In accordance with paragraph 11(b) of rule XXVI of the Standing Rules of the Senate, the Committee provides the following evaluation of the regulatory impact of the legislation, as reported:

NUMBER OF PERSONS COVERED

The reported bill would reauthorize a national tsunami warning system within NOAA. It does not authorize any new regulations and therefore will not subject any individuals or businesses to new regulations.

ECONOMIC IMPACT

H.R. 34 would authorize appropriations of \$27 million for the program for each of the fiscal years 2016 through 2021.

PRIVACY

The bill would not impact the personal privacy of individuals.

PAPERWORK

The reported bill would not increase paperwork requirements for the private sector. The bill would require a number of reports from the Federal Government. No later than 180 days after enactment, the Administrator of NOAA would be required to submit to Congress a report on authorities and activities that are needed for the TsunamiReady Program to be accredited by the Emergency Management Accreditation Program. No later than one year after enactment, the Administrator of NOAA would be required to submit a report to Congress on the implementation of this Act. Not less frequently than once every four years, the Administrator of NOAA would be required to submit to Congress a report on the findings and recommendations from the Tsunami Science and Technology Advisory Panel.

In addition, the Administrator of NOAA and the Secretary of Homeland Security in coordination with the Director of the U.S. Geological Survey, Administrator of NOAA of the Federal Emergency Management Agency, the Chief of the National Guard Bureau, and the heads of other Federal agencies considered appropriate, would submit a report to Congress on the national efforts in effect on the day before the date of enactment of this Act that support rapid emergency response following a tsunami event in the United States.

The Administrator of NOAA would be required to notify Congress within 90 days of a significant tsunami warning and include brief information on the accuracy of the model used, the specific equipment that detected the incidents (and any equipment that did not detect the incident due to malfunction or otherwise), and the effectiveness of the warning communication. Lastly, the Administrator of NOAA would be required to develop uniform operational procedures for the tsunami warning centers.

CONGRESSIONALLY DIRECTED SPENDING

In compliance with paragraph 4(b) of rule XLIV of the Standing Rules of the Senate, the Committee provides that no provisions contained in the bill, as reported, meet the definition of congressionally directed spending items under the rule.

SECTION-BY-SECTION ANALYSIS

Section 1. Short title.

This section would designate the short title of this bill as the “Tsunami Warning, Education, and Research Act of 2015.”

Section 2. Reference to the Tsunami Warning and Education Act.

Amendments to this Act would be considered to be made to the Tsunami Warning and Education Act (33 U.S.C. 3201 et seq.).

Section 3. Expansion of purpose of the Tsunami Warning and Education Act.

This section would amend section 3 of the Tsunami Warning and Education Act (33 U.S.C. 3202) to add language to enhance and modernize the existing Tsunami Warning System in order to increase accuracy of forecasts, warnings, and reduce false alarms by

incorporating and improving research, outreach, and mitigation. It also would require the development of uniform standards and guidelines for mapping, modeling, education and outreach, and efforts to improve detection, warning, and recovery.

Section 4. Modification of tsunami forecasting and warning program.

This section would amend section 4 of the Tsunami Warning and Education Act (33 U.S.C. 3203) by defining the Tsunami Warning Centers. The NTWC, located in Alaska, is primarily responsible for Alaska and the continental United States. The PTWC, located in Hawaii, is primarily responsible for Hawaii, the Caribbean, and other areas of the Pacific not covered by the NTWC. The Administrator of NOAA also would be required to support any additional forecast and warning centers determined by the NWS to be necessary.

The tsunami warning centers are responsible for continuously monitoring data, evaluating events that have the potential to generate a tsunami, utilizing a range of models for prediction, disseminating forecasts, coordinating and sharing information with emergency management officials, and making data available to the public. The Administrator of NOAA would need to ensure that resources are available to fulfill the obligations of this Act, to include supercomputing resources to run rapid models needed for warnings. To the degree practicable, NOAA is to maintain not less than 80 percent of the DART® buoy array at operational capacity. The warning centers would need to maintain fail-safe warning capabilities and perform back-up for each other.

The Administrator of NOAA would be required to develop uniform operational procedures for the centers that would include use of software applications, checklists, decision support tools, and tsunami warning products; and guidelines and metrics for evaluating and improving tsunami forecast models would be required to be distributed.

The Administrator of NOAA would be required to notify Congress within 90 days of a significant tsunami warning and include brief information on the accuracy of the model used, the specific equipment that detected the incidents (and any equipment that did not detect the incident due to malfunction or otherwise), and the effectiveness of the warning communication. A significant tsunami warning is considered a warning of a tsunami that has the potential to endanger life or cause extensive property damage.

Section 5. Modification of national tsunami hazard mitigation program.

This section would amend section 5 of the Tsunami Warning and Education Act (33 U.S.C. 3204) to require the Administrator of NOAA to work with the Federal Emergency Management Agency to conduct community-based tsunami hazard mitigation to improve readiness and resiliency. Components of the program would include assistance to States; evacuation planning, including maps of evacuation areas and routes; promotion of tsunami warning and mitigation measures; and dissemination of guidelines and standards for mapping products, inundation models, and effective emergency exercises. At-risk communities where models indicate timely evacu-

ation is not probable, technical assistance should be used for vertical evacuation structure planning. In coordination with the U.S. Coast Guard, guidance should be established for at-risk ports and harbors. Social science research should also be incorporated into community readiness and resiliency.

In addition to the activities outlined above, the program could include: risk management training for local officials; intergovernmental tsunami response exercise planning; risk notification systems that coordinate and build upon existing systems and engage government, business, nongovernmental organization, and the media.

The requirements above would be maintained with the assistance of a coordinating committee established by the Administrator of NOAA. The committee would be composed of members from State representatives in at-risk areas and representatives of Federal, State, tribal, territorial, and local governments. This committee would be required to provide feedback on how funds should be prioritized, and provide recommendations to the Administrator of NOAA on how to improve and advance the TsunamiReady Program. Section 14 of the Federal Advisory Committee Act (5 U.S.C. App. 14) would not apply to this committee.

This section also would specify that no new regulatory authority for any Federal agency is being established. No later than 180 days after enactment, the Administrator of NOAA would be required to submit to Congress a report on authorities and activities that are needed for the TsunamiReady Program to be accredited by the Emergency Management Accreditation Program.

Section 6. Modification of tsunami research program.

This section would amend section 6 of the Tsunami Warning and Education Act (33 U.S.C. 3205) to require the research programs to consider other appropriate research to mitigate the impacts of a tsunami and to develop the technical basis for validating tsunami maps, numerical models, digital elevation models, and forecasts. Social science should be considered when assessing community warning, education, and evacuation materials. Coordination of research to operations should be done with the NWS.

Section 7. Global tsunami warning and mitigation network.

This section would amend section 7 of the Tsunami Warning and Education Act (33 U.S.C. 3206) to require NOAA to provide technical assistance and training to the Intergovernmental Oceanographic Commission of the United Nations Education, Scientific, and Cultural Organization, the World Meteorological Organization of the United Nations, and other international entities as part of the efforts to enhance and develop global tsunami forecasts and warnings. In cooperation with the Intergovernmental Oceanographic Commission, the Administrator of NOAA may operate an International Tsunami Information Center to improve tsunami preparedness for all Pacific Ocean nations participating in the International Tsunami Warning System of the Pacific.

Section 8. Tsunami science and technology advisory panel.

This section would designate the Tsunami Science and Technology Advisory Panel composed of no fewer than seven members

selected by the Administrator of NOAA to provide advice on tsunami science, technology, and regional preparedness. Not less frequently than once every four years, the Administrator of NOAA would be required to submit to Congress a report on the findings and recommendations from the advisory panel.

Section 9. Reports.

The Administrator of NOAA would be required to submit a report to Congress on the implementation of this Act, no later than one year after enactment.

In addition, the Administrator of NOAA and the Secretary of Homeland Security in coordination with the Director of the U.S. Geological Survey, Administrator of the Federal Emergency Management Agency, the Chief of the National Guard Bureau, and the heads of other Federal agencies considered appropriate, would be required to submit a report to Congress on the national efforts in effect on the day before the date of enactment of this Act that support rapid emergency response following a tsunami event in the United States.

Section 10. Authorization of appropriations.

This section would amend section 9 (33 U.S.C. 3207) of the Tsunami Warning and Education Act to authorize \$27,000,000 for each of fiscal years 2016 through 2021. The legislation would direct 27 percent of appropriated funds be used on State-level activities under the NHMP, consistent with current practice. In addition, not less than eight percent would be for the Tsunami Research Program.

Section 11. Outreach responsibilities.

The Administrator of NOAA would be required to develop and carry out formal outreach activities to improve tsunami education and awareness, which may include coordination with local Weather Forecast Offices.

Section 12. Repeal of duplicate provisions of law.

The Magnuson-Stevens Fishery Conservation and Management Reauthorization Act of 2006 (Public Law 109—479) would be amended by striking title VIII relating to a tsunami forecasting and warning program.

CHANGES IN EXISTING LAW

In compliance with paragraph 12 of rule XXVI of the Standing Rules of the Senate, changes in existing law made by the bill, as reported, are shown as follows (existing law proposed to be omitted is enclosed in black brackets, new material is printed in italic, existing law in which no change is proposed is shown in roman):

TSUNAMI WARNING AND EDUCATION ACT

[Public Law 109—424; 33 U.S.C. 3201 et seq.]

SEC. 3. PURPOSES.

[33 U.S.C. 3202]

The purposes of this Act are—

(1) to improve tsunami detection, forecasting, warnings, *research*, notification, outreach, and mitigation to protect life and property in the United States;

[(2) to enhance and modernize the existing Pacific Tsunami Warning System to increase coverage, reduce false alarms, and increase the accuracy of forecasts and warnings, and to expand detection and warning systems to include other vulnerable States and United States territories, including the Atlantic Ocean, Caribbean Sea, and Gulf of Mexico areas;]

(2) to enhance and modernize the existing United States Tsunami Warning System to increase the accuracy of forecasts and warnings, to ensure full coverage of tsunami threats to the United States with a network of detection assets, and to reduce false alarms;

[(3) to improve mapping, modeling, research, and assessment efforts to improve tsunami detection, forecasting, warnings, notification, outreach, mitigation, response, and recovery;]

(3) to improve and develop standards and guidelines for mapping, modeling, and assessment efforts to improve tsunami detection, forecasting, warnings, notification, mitigation, resiliency, response, outreach, and recovery;

(4) to improve research efforts related to improving tsunami detection, forecasting, warnings, notification, mitigation, resiliency, response, outreach, and recovery;

[(4)] (5) to improve [and increase], *increase, and develop uniform standards and guidelines for education and outreach activities and ensure that those receiving tsunami warnings and the at-risk public know what to do when a tsunami is approaching, including the warning signs of locally generated tsunami;*

[(5)] (6) to provide technical and other assistance to speed international efforts to establish regional tsunami warning systems in vulnerable areas worldwide[, including the Indian Ocean; and];

(7) to foster resilient communities in the face of tsunami and other similar coastal hazards; and

[(6)] (8) to improve Federal, State, and international coordination for detection, warnings, and outreach for tsunami and other coastal impacts.

SEC. 4. TSUNAMI FORECASTING AND WARNING PROGRAM.

[33 U.S.C. 3203]

(a) IN GENERAL.—The Administrator, through the National Weather Service and in consultation with other relevant Administration offices, shall operate a program to provide tsunami detection, forecasting, and warnings for the Pacific and Arctic Ocean regions and for the [Atlantic Ocean, Caribbean Sea, and Gulf of Mexico region] *Atlantic Ocean region, including the Caribbean Sea and the Gulf of Mexico.*

(b) COMPONENTS.—The program under this section shall—

(1) include the tsunami warning centers [established] *supported or maintained* under subsection (d);

(2) to the degree practicable, maintain not less than 80 percent of the Deep-ocean Assessment and Reporting of Tsunamis buoy array at operational capacity to optimize data reliability;

[(2)] (3) utilize and maintain an array of robust tsunami detection technologies;

[(3)] (4) maintain detection equipment in operational condition to fulfill the detection, forecasting, and warning requirements of this Act;

[(4)] provide tsunami forecasting capability based on models and measurements, including tsunami inundation models and maps for use in increasing the preparedness of communities, including through the TsunamiReady program;]

(5) *provide tsunami forecasting capability based on models and measurements, including tsunami inundation models and maps for use in increasing the preparedness of communities and safeguarding port and harbor operations, that incorporate inputs, including—*

(A) *the United States and global ocean and coastal observing system;*

(B) *the global Earth observing system;*

(C) *the global seismic network;*

(D) *the Advanced National Seismic system;*

(E) *tsunami model validation using historical and paleotsunami data;*

(F) *digital elevation models and bathymetry; and*

(G) *newly developing tsunami detection methodologies using satellites and airborne remote sensing;*

[(5)] (6) maintain data quality and management systems to support the requirements of the program;

[(6)] (7) include a cooperative effort among the Administration, the United States Geological Survey, and the National Science Foundation under which the Geological Survey and the National Science Foundation shall provide rapid and reliable seismic information to the Administration from international and domestic seismic networks;

(8) *include a cooperative effort among the Administration, the United States Geological Survey, and the National Science Foundation under which the Director of the United States Geological Survey and the Director of the National Science Foundation shall—*

(A) *provide rapid and reliable seismic information to the Administrator from international and domestic seismic networks; and*

(B) *support seismic stations installed before the date of the enactment of the Tsunami Warning, Education, and Research Act of 2015 to supplement coverage in areas of sparse instrumentation;*

[(7)] (9) provide a capability for the dissemination of warnings, *including graphical warning products*, to at-risk States, territories, and tsunami communities through rapid and reliable notification to government officials and the public, including utilization of and coordination with existing Federal warning systems, including the National Oceanic and Atmospheric Administration Weather Radio All Hazards Program *and Wireless Emergency Alerts*;

[(8)] (10) *provide and allow, as practicable, for integration of tsunami detection technologies with other environmental ob-*

serving technologies *and commercial and Federal undersea communications cables*; and

[(9)] (11) include any technology the Administrator considers appropriate to fulfill the objectives of the program under this section.

[(c) SYSTEM AREAS.—The program under this section shall operate—

[(1) a Pacific tsunami warning system capable of forecasting tsunami anywhere in the Pacific and Arctic Ocean regions and providing adequate warnings; and

[(2) an Atlantic Ocean, Caribbean Sea, and Gulf of Mexico tsunami warning system capable of forecasting tsunami and providing adequate warnings in areas of the Atlantic Ocean, Caribbean Sea, and Gulf of Mexico that are determined—

[(A) to be geologically active, or to have significant potential for geological activity; and

[(B) to pose significant risks of tsunami for States along the coastal areas of the Atlantic Ocean, Caribbean Sea, or Gulf of Mexico.]

(c) *TSUNAMI WARNING SYSTEM.—The program under this section shall operate a tsunami warning system that—*

(1) *is capable of forecasting tsunami, including forecasting tsunami arrival time and inundation estimates, anywhere in the Pacific and Arctic Ocean regions and providing adequate warnings;*

(2) *is capable of forecasting and providing adequate warnings, including tsunami arrival time and inundation models where applicable, in areas of the Atlantic Ocean, including the Caribbean Sea and Gulf of Mexico, that are determined—*

(A) *to be geologically active, or to have significant potential for geological activity; and*

(B) *to pose significant risks of tsunami for States along the coastal areas of the Atlantic Ocean, Caribbean Sea, or Gulf of Mexico; and*

(3) *supports other international tsunami forecasting and warning efforts.*

[(d) TSUNAMI WARNING CENTERS.—

[(1) IN GENERAL.—The Administrator, through the National Weather Service, shall maintain or establish—

[(A) a Pacific Tsunami Warning Center in Hawaii;

[(B) a West Coast and Alaska Tsunami Warning Center in Alaska; and

[(C) any additional forecast and warning centers determined by the National Weather Service to be necessary.

[(2) RESPONSIBILITIES.—The responsibilities of each tsunami warning center shall include—

[(A) continuously monitoring data from seismological, deep ocean, and tidal monitoring stations;

[(B) evaluating earthquakes that have the potential to generate tsunami;

[(C) evaluating deep ocean buoy data and tidal monitoring stations for indications of tsunami resulting from earthquakes and other sources;

【(D) disseminating forecasts and tsunami warning bulletins to Federal, State, and local government officials and the public;

【(E) coordinating with the tsunami hazard mitigation program described in section 5 to ensure ongoing sharing of information between forecasters and emergency management officials; and

【(F) making data gathered under this Act and post-warning analyses conducted by the National Weather Service or other relevant Administration offices available to researchers.】

(d) *TSUNAMI WARNING CENTERS.*—

(1) *IN GENERAL.*—*The Administrator shall support or maintain centers to support the tsunami warning system required by subsection (c). The Centers shall include—*

(A) *the National Tsunami Warning Center, located in Alaska, which is primarily responsible for Alaska and the continental United States;*

(B) *the Pacific Tsunami Warning Center, located in Hawaii, which is primarily responsible for Hawaii, the Caribbean, and other areas of the Pacific not covered by the National Center; and*

(C) *any additional forecast and warning centers determined by the National Weather Service to be necessary.*

(2) *RESPONSIBILITIES.*—*The responsibilities of the centers supported or maintained pursuant to paragraph (1) shall include the following:*

(A) *Continuously monitoring data from seismological, deep ocean, coastal sea level, and tidal monitoring stations and other data sources as may be developed and deployed.*

(B) *Evaluating earthquakes, landslides, and volcanic eruptions that have the potential to generate tsunamis.*

(C) *Evaluating deep ocean buoy data and tidal monitoring stations for indications of tsunami resulting from earthquakes and other sources.*

(D) *To the extent practicable, utilizing a range of models, including ensemble models, to predict tsunami, including arrival times, flooding estimates, coastal and harbor currents, and duration.*

(E) *Using data from the Integrated Ocean Observing System of the Administration in coordination with regional associations to calculate new inundation estimates and periodically update existing inundation estimates.*

(F) *Ensuring supercomputing resources of the National Centers for Environmental Prediction are available to run, as rapidly as possible, such computer models as are needed for purposes of the tsunami warning system operated pursuant to subsection (c).*

(G) *Disseminating forecasts and tsunami warning bulletins to Federal, State, tribal, and local government officials and the public.*

(H) *Coordinating with the tsunami hazard mitigation program conducted under section 5 to ensure ongoing sharing of information between forecasters and emergency management officials.*

(I) *Evaluating and recommending procedures for ports and harbors at risk of tsunami inundation, including review of readiness, response, and communication strategies to ensure coordination and data sharing with the Coast Guard.*

(J) *Making data gathered under this Act and post-warning analyses conducted by the National Weather Service or other relevant Administration offices available to the public.*

(K) *Integrating and modernizing the program operated under this section with advances in tsunami science to improve performance without compromising service.*

(3) *FAIL-SAFE WARNING CAPABILITY.—The tsunami warning centers supported or maintained pursuant to paragraph (I) shall maintain a fail-safe warning capability and perform back-up duties for each other.*

(4) *COORDINATION WITH NATIONAL WEATHER SERVICE.—The Administrator shall coordinate with the forecast offices of the National Weather Service, the centers supported or maintained pursuant to paragraph (I), and such program offices of the Administration as the Administrator or the coordinating committee consider appropriate to ensure that regional and local forecast offices—*

(A) *have the technical knowledge and capability to disseminate tsunami warnings for the communities they serve;*

(B) *leverage connections with local emergency management officials for optimally disseminating tsunami warnings and forecasts; and*

(C) *implement mass communication tools in effect on the day before the date of the enactment of the Tsunami Warning, Education, and Research Act of 2015 used by the National Weather Service on such date and newer mass communication technologies as they are developed as a part of the Weather-Ready Nation program of the Administration, or otherwise, for the purpose of timely and effective delivery of tsunami warnings.*

(5) *UNIFORM OPERATING PROCEDURES.—The Administrator shall—*

(A) *develop uniform operational procedures for the centers supported or maintained pursuant to paragraph (I), including the use of software applications, checklists, decision support tools, and tsunami warning products that have been standardized across the program supported under this section;*

(B) *ensure that processes and products of the warning system operated pursuant to subsection (c)—*

(i) *reflect industry best practices when practicable;*

(ii) *conform to the maximum extent practicable with internationally recognized standards for information technology; and*

(iii) *conform to the maximum extent practicable with other warning products and practices of the National Weather Service;*

(C) *ensure that future adjustments to operational protocols, processes, and warning products—*

(i) are made consistently across the warning system operated pursuant to subsection (c); and

(ii) are applied in a uniform manner across such warning system;

(D) establish a systematic method for information technology product development to improve long-term technology planning efforts; and

(E) disseminate guidelines and metrics for evaluating and improving tsunami forecast models.

(6) AVAILABLE RESOURCES.—The Administrator, through the National Weather Service, shall ensure that resources are available to fulfill the obligations of this Act. This includes ensuring supercomputing resources are available to run such computer models as are needed for purposes of the tsunami warning system operated pursuant to subsection (c).

(e) TRANSFER OF TECHNOLOGY; MAINTENANCE AND UPGRADES.—

[(1) IN GENERAL.—In carrying out this section, the National Weather Service, in consultation with other relevant Administration offices, shall—

[(A) develop requirements for the equipment used to forecast tsunami, which shall include provisions for multipurpose detection platforms, reliability and performance metrics, and to the maximum extent practicable how the equipment will be integrated with other United States and global ocean and coastal observation systems, the global earth observing system of systems, global seismic networks, and the Advanced National Seismic System;

[(B) develop and execute a plan for the transfer of technology from ongoing research described in section 6 into the program under this section; and

[(C) ensure that maintaining operational tsunami detection equipment is the highest priority within the program carried out under this Act.

[(2) REPORT TO CONGRESS.—

[(A) Not later than 1 year after the date of enactment of this Act, the National Weather Service, in consultation with other relevant Administration offices, shall transmit to Congress a report on how the tsunami forecast system under this section will be integrated with other United States and global ocean and coastal observation systems, the global earth observing system of systems, global seismic networks, and the Advanced National Seismic System.

[(B) Not later than 3 years after the date of enactment of this Act, the National Weather Service, in consultation with other relevant Administration offices, shall transmit a report to Congress on how technology developed under section 6 is being transferred into the program under this section.]

(e) TRANSFER OF TECHNOLOGY; MAINTENANCE AND UPGRADES.—
In carrying out this section, the Administrator shall—

(1) develop requirements for the equipment used to forecast tsunami, including—

(A) provisions for multipurpose detection platforms;

(B) reliability and performance metrics; and

(C) to the maximum extent practicable, requirements for the integration of equipment with other United States and global ocean and coastal observation systems, the global Earth observing system of systems, the global seismic networks, and the Advanced National Seismic System;

(2) develop and execute a plan for the transfer of technology from ongoing research conducted as part of the program supported or maintained under section 6 into the program under this section; and

(3) ensure that the Administration's operational tsunami detection equipment is properly maintained.

[(f) FEDERAL COOPERATION.—When deploying and maintaining tsunami detection technologies, the Administrator shall seek the assistance and assets of other appropriate Federal agencies.]

(f) FEDERAL COOPERATION.—When deploying and maintaining tsunami detection technologies under the program under this section, the Administrator shall—

(1) identify which assets of other Federal agencies are necessary to support such program; and

(2) work with each agency identified under paragraph (1)—
(A) to acquire the agency's assistance; and
(B) to prioritize the necessary assets.

[(g) ANNUAL EQUIPMENT CERTIFICATION.—At the same time Congress receives the budget justification documents in support of the President's annual budget request for each fiscal year, the Administrator shall transmit to the Committee on Commerce, Science, and Transportation of the Senate and the Committee on Science of the House of Representatives a certification that—

[(1) identifies the tsunami detection equipment deployed pursuant to this Act, as of December 31 of the preceding calendar year;

[(2) certifies which equipment is operational as of December 31 of the preceding calendar year;

[(3) in the case of any piece of such equipment that is not operational as of such date, identifies that equipment and describes the mitigation strategy that is in place—

[(A) to repair or replace that piece of equipment within a reasonable period of time; or

[(B) to otherwise ensure adequate tsunami detection coverage;

[(4) identifies any equipment that is being developed or constructed to carry out this Act but which has not yet been deployed, if the Administration has entered into a contract for that equipment prior to December 31 of the preceding calendar year, and provides a schedule for the deployment of that equipment; and

[(5) certifies that the Administrator expects the equipment described in paragraph (4) to meet the requirements, cost, and schedule provided in that contract.]

[(h)](g) CONGRESSIONAL NOTIFICATIONS.—[The Administrator]

(1) IN GENERAL.— The Administrator shall notify the Committee on Commerce, Science, and Transportation of the Senate and the Committee on Science of the House of Representatives within 30 days of—

[(1)] (A) impaired regional forecasting capabilities due to equipment or system failures; [and]

[(2)] (B) significant contractor failures or delays in completing work associated with the tsunami forecasting and warning system[.]; and

(C) the occurrence of a significant tsunami warning.

(2) CONTENTS.—In a case in which notice is submitted under paragraph (1) within 90 days of a significant tsunami warning described in subparagraph (C) of such paragraph, such notice shall include brief information and analysis of—

(A) the accuracy of the tsunami model used;

(B) the specific deep ocean or other monitoring equipment that detected the incident, as well as the deep ocean or other monitoring equipment that did not detect the incident due to malfunction or otherwise;

(C) the effectiveness of the warning communication procedures including the integration of warnings with State, territory, local, and tribal partners in the affected area under the jurisdiction of the National Weather Service; and

(D) such other findings as the Administrator considers appropriate.

[(i) REPORT.—Not later than January 31, 2010, the Comptroller General of the United States shall transmit a report to the Committee on Commerce, Science, and Transportation of the Senate and the Committee on Science of the House of Representatives that—

[(1) evaluates the current status of the tsunami detection, forecasting, and warning system and the tsunami hazard mitigation program established under this Act, including progress toward tsunami inundation mapping of all coastal areas vulnerable to tsunami and whether there has been any degradation of services as a result of the expansion of the program;

[(2) evaluates the National Weather Service's ability to achieve continued improvements in the delivery of tsunami detection, forecasting, and warning services by assessing policies and plans for the evolution of modernization systems, models, and computational abilities (including the adoption of new technologies); and

[(3) lists the contributions of funding or other resources to the program by other Federal agencies, particularly agencies participating in the program.

[(j) EXTERNAL REVIEW.—The Administrator shall enter into an arrangement with the National Academy of Sciences to review the tsunami detection, forecast, and warning program established under this Act to assess further modernization and coverage needs, as well as long-term operational reliability issues, taking into account measures implemented under this Act. The review shall also include an assessment of how well the forecast equipment has been integrated into other United States and global ocean and coastal observation systems and the global earth observing system of systems. Not later than 2 years after the date of enactment of this Act, the Administrator shall transmit a report containing the National Academy of Sciences' recommendations, the Administrator's responses to the recommendations, including those where the Administrator disagrees with the Academy, a timetable to implement

the accepted recommendations, and the cost of implementing all the Academy's recommendations, to the Committee on Commerce, Science, and Transportation of the Senate and the Committee on Science of the House of Representatives.

[(k) REPORT.—Not later than 3 months after the date of enactment of this Act, the Administrator shall establish a process for monitoring and certifying contractor performance in carrying out the requirements of any contract to construct or deploy tsunami detection equipment, including procedures and penalties to be imposed in cases of significant contractor failure or negligence.]

SEC. 5. NATIONAL TSUNAMI HAZARD MITIGATION PROGRAM.

[33 U.S.C. 3204]

[(a) IN GENERAL.—The Administrator, through the National Weather Service and in consultation with other relevant Administration offices, shall conduct a community-based tsunami hazard mitigation program to improve tsunami preparedness of at-risk areas in the United States and its territories.

[(b) COORDINATING COMMITTEE.—In conducting the program under this section, the Administrator shall establish a coordinating committee comprising representatives of Federal, State, local, and tribal government officials. The Administrator may establish subcommittees to address region-specific issues. The committee shall—

[(1) recommend how funds appropriated for carrying out the program under this section will be allocated;

[(2) ensure that areas described in section 4(c) in the United States and its territories can have the opportunity to participate in the program;

[(3) provide recommendations to the National Weather Service on how to improve the TsunamiReady program, particularly on ways to make communities more tsunami resilient through the use of inundation maps and other mitigation practices; and

[(4) ensure that all components of the program are integrated with ongoing hazard warning and risk management activities, emergency response plans, and mitigation programs in affected areas, including integrating information to assist in tsunami evacuation route planning.

[(c) PROGRAM COMPONENTS.—The program under this section shall—

[(1) use inundation models that meet a standard of accuracy defined by the Administration to improve the quality and extent of inundation mapping, including assessment of vulnerable inner coastal and nearshore areas, in a coordinated and standardized fashion to maximize resources and the utility of data collected;

[(2) promote and improve community outreach and education networks and programs to ensure community readiness, including the development of comprehensive coastal risk and vulnerability assessment training and decision support tools, implementation of technical training and public education programs, and providing for certification of prepared communities;

[(3) integrate tsunami preparedness and mitigation programs into ongoing hazard warning and risk management activities, emergency response plans, and mitigation programs in affected areas, including integrating information to assist in tsunami evacuation route planning;

[(4) promote the adoption of tsunami warning and mitigation measures by Federal, State, tribal, and local governments and nongovernmental entities, including educational programs to discourage development in high-risk areas; and

[(5) provide for periodic external review of the program.

[(d) SAVINGS CLAUSE.—Nothing in this section shall be construed to require a change in the chair of any existing tsunami hazard mitigation program subcommittee.]

(a) *PROGRAM REQUIRED.*—*The Administrator shall, in consultation with the Administrator of the Federal Emergency Management Agency and the heads of such other agencies as the Administrator considers relevant, conduct a community-based tsunami hazard mitigation program to improve tsunami preparedness and resiliency of at-risk areas in the United States and the territories of the United States.*

(b) *PROGRAM COMPONENTS.*—*The Program conducted pursuant to subsection (a) shall include the following:*

(1) *Technical and financial assistance to coastal States, territories, tribes, and local governments to develop and implement activities under this section.*

(2) *Integration of tsunami preparedness and mitigation programs into ongoing State-based hazard warning, resilience planning, and risk management activities, including predisaster planning, emergency response, evacuation planning, disaster recovery, hazard mitigation, and community development and redevelopment planning programs in affected areas.*

(3) *Activities to promote the adoption of tsunami resilience, preparedness, warning, and mitigation measures by Federal, State, territorial, tribal, and local governments and nongovernmental entities, including educational and risk communication programs to discourage development in high-risk areas.*

(4) *Activities to support the development of regional tsunami hazard and risk assessments. Such regional risk assessments may include the following:*

(A) *The sources, sizes, and other relevant historical data of tsunami in the region, including paleotsunami data.*

(B) *Inundation models and maps of critical infrastructure and socioeconomic vulnerability in areas subject to tsunami inundation.*

(C) *Maps of evacuation areas and evacuation routes, including, when appropriate, traffic studies that evaluate the viability of evacuation routes.*

(D) *Evaluations of the size of populations that will require evacuation, including populations with special evacuation needs.*

(E) *Evaluations and technical assistance for vertical evacuation structure planning for communities where models indicate limited or no ability for timely evacuation, especially in areas at risk of near shore generated tsunami.*

(F) *Evaluation of at-risk ports and harbors.*

(G) *Evaluation of the effect of tsunami currents on the foundations of closely-spaced, coastal high-rise structures.*

(5) *Activities to promote preparedness in at-risk ports and harbors, including the following:*

(A) *Evaluation and recommendation of procedures for ports and harbors in the event of a distant or near-field tsunami.*

(B) *A review of readiness, response, and communication strategies to ensure coordination and data sharing with the Coast Guard.*

(6) *Activities to support the development of community-based outreach and education programs to ensure community readiness and resilience, including the following:*

(A) *The development, implementation, and assessment of technical training and public education programs, including education programs that address unique characteristics of distant and near-field tsunami.*

(B) *The development of decision support tools.*

(C) *The incorporation of social science research into community readiness and resilience efforts.*

(D) *The development of evidence-based education guidelines.*

(7) *Dissemination of guidelines and standards for community planning, education, and training products, programs, and tools, including—*

(A) *standards for—*

(i) *mapping products;*

(ii) *inundation models; and*

(iii) *effective emergency exercises; and*

(B) *recommended guidance for at-risk port and harbor tsunami warning, evacuation, and response procedures in coordination with the Coast Guard.*

(c) *AUTHORIZED ACTIVITIES.—In addition to activities conducted under subsection (b), the program conducted pursuant to subsection (a) may include the following:*

(1) *Multidisciplinary vulnerability assessment research, education, and training to help integrate risk management and resilience objectives with community development planning and policies.*

(2) *Risk management training for local officials and community organizations to enhance understanding and preparedness.*

(3) *Interagency, Federal, State, tribal, and territorial intergovernmental tsunami response exercise planning and implementation in high risk areas.*

(4) *Development of practical applications for existing or emerging technologies, such as modeling, remote sensing, geospatial technology, engineering, and observing systems, including the integration of tsunami sensors into Federal and commercial submarine telecommunication cables if practicable.*

(5) *Risk management, risk assessment, and resilience data and information services, including—*

(A) *access to data and products derived from observing and detection systems; and*

(B) *development and maintenance of new integrated data products to support risk management, risk assessment, and resilience programs.*

(6) *Risk notification systems that coordinate with and build upon existing systems and actively engage decisionmakers, State, local, tribal, and territorial governments and agencies,*

business communities, nongovernmental organizations, and the media.

(7) Formation of regional coastal risk management coalitions of Federal, State, local and tribal governments, community groups, academic institutions, and non-governmental groups to advance the goals of this section for communities facing common coastal hazards and risks. Such coalitions may enter into an agreement with an organization described in section 501(c)(3) of the Internal Revenue Code of 1986 to establish a nonprofit foundation in order to accept gifts and donations to support of the goals of this section.

(d) COORDINATING COMMITTEE.—

(1) IN GENERAL.—The Administrator shall maintain a coordinating committee to assist the Administrator in the conduct of the program required by subsection (a).

(2) COMPOSITION.—The coordinating committee shall be composed of members as follows:

(A) Representatives of States and territories most at risk from tsunami, including Alaska, Washington, Oregon, California, Hawaii, Puerto Rico, Guam and American Samoa.

(B) Such other members as the Administrator considers appropriate to represent Federal, State, tribal, territorial, and local governments.

(3) SUBCOMMITTEES.—The Administrator may approve the formation of subcommittees to address specific program components or regional issues.

(4) RESPONSIBILITIES.—The coordinating committee shall—

(A) provide feedback on how funds should be prioritized to carry out the program required by subsection (a);

(B) ensure that areas described in section 4(c) in the United States and its territories have the opportunity to participate in the program;

(C) provide recommendations to the Administrator on how to improve and continuously advance the TsunamiReady program of the National Weather Service, particularly on ways to make communities more tsunami resilient through the use of inundation maps and models and other hazard mitigation practices;

(D) ensure that all components of the program required by subsection (a) are integrated with ongoing State based hazard warning, risk management, and resilience activities, including—

(i) integrating activities with emergency response plans, disaster recovery, hazard mitigation, and community development programs in affected areas; and

(ii) integrating information to assist in tsunami evacuation route planning.

(5) EXEMPTION FROM FACa TERMINATION REQUIREMENT.—Section 14 of the Federal Advisory Committee Act (5 U.S.C. App. 14) shall not apply to the committee established and maintained pursuant to paragraph (1).

(e) NO PREEMPTION WITH RESPECT TO DESIGNATION OF AT-RISK AREAS.—The establishment of national standards for inundation models under this section shall not prevent States, territories, tribes,

and local governments from designating additional areas as being at risk based on knowledge of local conditions.

(f) *NO NEW REGULATORY AUTHORITY.*—Nothing in this Act may be construed as establishing new regulatory authority for any Federal agency.

SEC. 6. TSUNAMI RESEARCH PROGRAM.

[33 U.S.C. 3205]

【The Administrator shall, in consultation with other agencies and academic institutions, and with the coordinating committee established under section 5(b), establish or maintain】

(a) *IN GENERAL.*— *The Administrator shall, in consultation with such other Federal agencies, State, tribal, and territorial governments, and academic institutions as the Administrator considers appropriate, the coordinating committee under section 5(d), and the panel under section 8(a), support or maintain a tsunami research program to develop detection, forecast, communication, and mitigation science and technology, including advanced sensing techniques, information and communication technology, data collection, analysis, [and assessment for tsunami tracking and numerical forecast modeling. Such research program shall—] assessment for tsunami tracking and numerical forecast modeling, and standards development.*

(b) *RESPONSIBILITIES.*— *The research program supported or maintained pursuant to subsection (a) shall—*

【(1) consider other appropriate research to mitigate the impact of tsunami;】

(1) *consider other appropriate and cost effective research to mitigate the impact of tsunami, including the improvement of near-field and distant tsunami detection and forecasting capabilities, which may include use of a new generation of the Deep-ocean Assessment and Reporting of Tsunamis array, integration of tsunami sensors into commercial and Federal telecommunications cables, and other real-time tsunami monitoring systems and supercomputer capacity of the Administration to develop a rapid tsunami forecast for all United States coastlines;*

(2) *coordinate with the National Weather Service on technology to be transferred to operations;*

(3) 【include】 *conduct social science research to develop and assess community warning, education, and evacuation materials; [and]*

(4) *develop the technical basis for validation of tsunami maps, numerical tsunami models, digital elevation models, and forecasts; and*

【(4)】 (5) *ensure that research and findings are available [to the scientific community] to the public.*

SEC. 7. GLOBAL TSUNAMI WARNING AND MITIGATION NETWORK.

[33 U.S.C. 3206]

【(a) *INTERNATIONAL TSUNAMI WARNING SYSTEM.*—The Administrator, through the National Weather Service and in consultation with other relevant Administration offices, in coordination with other members of the United States Interagency Committee of the National Tsunami Hazard Mitigation Program, shall provide technical assistance and training to the Intergovernmental Oceanographic Commission, the World Meteorological Organization, and

other international entities, as part of international efforts to develop a fully functional global tsunami forecast and warning system comprising regional tsunami warning networks, modeled on the International Tsunami Warning System of the Pacific.】

(a) *SUPPORT FOR DEVELOPMENT OF AN INTERNATIONAL TSUNAMI WARNING SYSTEM.*—*The Administrator shall, in coordination with the Secretary of State and in consultation with such other agencies as the Administrator considers relevant, provide technical assistance and training to the Intergovernmental Oceanographic Commission of the United Nations Educational, Scientific, and Cultural Organization, the World Meteorological Organization of the United Nations, and such other international entities as the Administrator considers appropriate, as part of the international efforts to develop a fully functional global tsunami forecast and warning system comprised of regional tsunami warning networks.*

(b) *INTERNATIONAL TSUNAMI INFORMATION CENTER.*—*The Administrator, through the National Weather Service and in consultation with other relevant Administration offices, in cooperation with the Intergovernmental Oceanographic Commission, [shall] may operate an International Tsunami Information Center to improve tsunami preparedness for all Pacific Ocean nations participating in the International Tsunami Warning System of the Pacific, and may also provide such assistance to other nations participating in a global tsunami warning system established through the Intergovernmental Oceanographic Commission. As part of its responsibilities around the world, the Center shall—*

- (1) monitor international tsunami warning activities around the world;
- (2) assist member states in establishing national warning systems, and make information available on current technologies for tsunami warning systems;
- (3) maintain a library of materials to promulgate knowledge about tsunamis in general and for use by the scientific community; and
- (4) disseminate information, including educational materials and research reports.

(c) *DETECTION EQUIPMENT; TECHNICAL ADVICE AND TRAINING.*—*In carrying out this section, the National Weather Service—*

- (1) shall give priority to assisting nations in identifying vulnerable coastal areas, creating inundation maps, obtaining or designing real-time detection and reporting equipment, and [establishing] *supporting* communication and warning networks and contact points in each vulnerable nation;
- (2) may [establish] *support* a process for transfer of detection and communication technology to affected nations for the purposes of [establishing] *supporting* the international tsunami warning system; and
- (3) shall provide technical and other assistance to support international tsunami programs.

(d) *DATA-SHARING REQUIREMENT.*—*The National Weather Service, when deciding to provide assistance under this section, may take into consideration the data sharing policies and practices of nations proposed to receive such assistance, with a goal to encourage all nations to support full and open exchange of data.*

SEC. 8. TSUNAMI SCIENCE AND TECHNOLOGY ADVISORY PANEL.

(a) *DESIGNATION.*—The Administrator shall designate an existing working group within the Science Advisory Board of the Administration to serve as the Tsunami Science and Technology Advisory Panel to provide advice to the Administrator on matters regarding tsunami science, technology, and regional preparedness.

(b) *MEMBERSHIP.*—

(1) *COMPOSITION.*—The working group designated under subsection (a) shall be composed of no fewer than 7 members selected by the Administrator from among individuals from academia or State agencies who have academic or practical expertise in physical sciences, social sciences, information technology, coastal resilience, emergency management, or such other disciplines as the Administrator considers appropriate.

(2) *FEDERAL EMPLOYMENT.*—No member of the working group designated pursuant to subsection (a) may be a Federal employee.

(c) *RESPONSIBILITIES.*—Not less frequently than once every 4 years, the working group designated under subsection (a) shall—

(1) review the activities of the Administration, and other Federal activities as appropriate, relating to tsunami research, detection, forecasting, warning, mitigation, resiliency, and preparation; and

(2) submit to the Administrator and such others as the Administrator considers appropriate—

(A) the findings of the working group with respect to the most recent review conducted pursuant to paragraph (1); and

(B) such recommendations for legislative or administrative action as the working group considers appropriate to improve Federal tsunami research, detection, forecasting, warning, mitigation, resiliency, and preparation.

(d) *REPORTS TO CONGRESS.*—Not less frequently than once every 4 years, the Administrator shall submit to the Committee on Commerce, Science, and Transportation of the Senate, and the Committee on Science, Space, and Technology of the House of Representatives a report on the findings and recommendations received by the Administrator under subsection (c)(2).

SEC. [8.]9. AUTHORIZATION OF APPROPRIATIONS.

[33 U.S.C. 3207]

There are authorized to be appropriated to the Administrator to carry out this Act—

(1) \$25,000,000 for fiscal year 2008, of which—

(A) not less than 27 percent of the amount appropriated shall be for the tsunami hazard mitigation program under section 5; and

(B) not less than 8 percent of the amount appropriated shall be for the tsunami research program under section 5;

(2) \$26,000,000 for fiscal year 2009, of which—

(A) not less than 27 percent of the amount appropriated shall be for the tsunami hazard mitigation program under section 5; and

(B) not less than 8 percent of the amount appropriated shall be for the tsunami research program under section 6;

(3) \$27,000,000 for fiscal year 2010, of which—

- (A) not less than 27 percent of the amount appropriated shall be for the tsunami hazard mitigation program under section 5; and
- (B) not less than 8 percent of the amount appropriated shall be for the tsunami research program under section 6;
- (4) \$28,000,000 for fiscal year 2011, of which—
- (A) not less than 27 percent of the amount appropriated shall be for the tsunami hazard mitigation program under section 5; and
- (B) not less than 8 percent of the amount appropriated shall be for the tsunami research program under section 6; **[and]**
- (5) \$29,000,000 for fiscal year 2012, of which—
- (A) not less than 27 percent of the amount appropriated shall be for the tsunami hazard mitigation program under section 5; and
- (B) not less than 8 percent of the amount appropriated shall be for the tsunami research program under section 6 **[.]; and**
- (6) \$27,000,000 for each of fiscal years 2016 through 2021, of which—
- (A) *not less than 27 percent of the amount appropriated for each fiscal year shall be for activities conducted at the State level under the tsunami hazard mitigation program under section 5; and*
- (B) *not less than 8 percent of the amount appropriated shall be for the tsunami research program under section 6.*

MAGNUSON-STEVENS FISHERY CONSERVATION AND
MANAGEMENT REAUTHORIZATION ACT OF 2006

TITLE VIII - TSUNAMI WARNING AND EDUCATION¹

[Public Law 109—479; 120 Stat. 3653]

[SEC. 801. SHORT TITLE.

[This title may be cited as the “Tsunami Warning and Education Act”.]

[SEC. 802. DEFINITIONS.

[In this title:

[(1) The term “Administration” means the National Oceanic and Atmospheric Administration.

[(2) The term “Administrator” means the Administrator of the National Oceanic and Atmospheric Administration.]

[SEC. 803. PURPOSES.

[The purposes of this title are—

[(1) to improve tsunami detection, forecasting, warnings, notification, outreach, and mitigation to protect life and property in the United States;

[(2) to enhance and modernize the existing Pacific Tsunami Warning System to increase coverage, reduce false alarms, and increase the accuracy of forecasts and warnings, and to expand

¹Duplicative law at title VIII of the Magnuson-Stevens Fishery Conservation and Management Reauthorization Act of 2006 (Public Law 109—479; 120 Stat. 3653) would be repealed by section 12(a) of the bill. Section 12(b) of the bill would provide that nothing in section 12 of the bill shall not be construed to repeal, or affect in any way, Public Law 109—424.

detection and warning systems to include other vulnerable States and United States territories, including the Atlantic Ocean, Caribbean Sea, and Gulf of Mexico areas;

【(3) to improve mapping, modeling, research, and assessment efforts to improve tsunami detection, forecasting, warnings, notification, outreach, mitigation, response, and recovery;

【(4) to improve and increase education and outreach activities and ensure that those receiving tsunami warnings and the at-risk public know what to do when a tsunami is approaching;

【(5) to provide technical and other assistance to speed international efforts to establish regional tsunami warning systems in vulnerable areas worldwide, including the Indian Ocean; and

【(6) to improve Federal, State, and international coordination for detection, warnings, and outreach for tsunami and other coastal impacts.】

【SEC. 804. TSUNAMI FORECASTING AND WARNING PROGRAM.

【(a) IN GENERAL.—The Administrator, through the National Weather Service and in consultation with other relevant Administration offices, shall operate a program to provide tsunami detection, forecasting, and warnings for the Pacific and Arctic Ocean regions and for the Atlantic Ocean, Caribbean Sea, and Gulf of Mexico region.

【(b) COMPONENTS.—The program under this section shall—

【(1) include the tsunami warning centers established under subsection (d);

【(2) utilize and maintain an array of robust tsunami detection technologies;

【(3) maintain detection equipment in operational condition to fulfill the detection, forecasting, and warning requirements of this title;

【(4) provide tsunami forecasting capability based on models and measurements, including tsunami inundation models and maps for use in increasing the preparedness of communities, including through the TsunamiReady program;

【(5) maintain data quality and management systems to support the requirements of the program;

【(6) include a cooperative effort among the Administration, the United States Geological Survey, and the National Science Foundation under which the Geological Survey and the National Science Foundation shall provide rapid and reliable seismic information to the Administration from international and domestic seismic networks;

【(7) provide a capability for the dissemination of warnings to at-risk States and tsunami communities through rapid and reliable notification to government officials and the public, including utilization of and coordination with existing Federal warning systems, including the National Oceanic and Atmospheric Administration Weather Radio All Hazards Program;

【(8) allow, as practicable, for integration of tsunami detection technologies with other environmental observing technologies; and

【(9) include any technology the Administrator considers appropriate to fulfill the objectives of the program under this section.

[(c) SYSTEM AREAS.—The program under this section shall operate—

[(1) a Pacific tsunami warning system capable of forecasting tsunami anywhere in the Pacific and Arctic Ocean regions and providing adequate warnings; and

[(2) an Atlantic Ocean, Caribbean Sea, and Gulf of Mexico tsunami warning system capable of forecasting tsunami and providing adequate warnings in areas of the Atlantic Ocean, Caribbean Sea, and Gulf of Mexico that are determined—

[(A) to be geologically active, or to have significant potential for geological activity; and

[(B) to pose significant risks of tsunami for States along the coastal areas of the Atlantic Ocean, Caribbean Sea, or Gulf of Mexico.

[(d) TSUNAMI WARNING CENTERS.—

[(1) IN GENERAL.—The Administrator, through the National Weather Service, shall maintain or establish—

[(A) a Pacific Tsunami Warning Center in Hawaii;

[(B) a West Coast and Alaska Tsunami Warning Center in Alaska; and

[(C) any additional forecast and warning centers determined by the National Weather Service to be necessary.

[(2) RESPONSIBILITIES.—The responsibilities of each tsunami warning center shall include—

[(A) continuously monitoring data from seismological, deep ocean, and tidal monitoring stations;

[(B) evaluating earthquakes that have the potential to generate tsunami;

[(C) evaluating deep ocean buoy data and tidal monitoring stations for indications of tsunami resulting from earthquakes and other sources;

[(D) disseminating forecasts and tsunami warning bulletins to Federal, State, and local government officials and the public;

[(E) coordinating with the tsunami hazard mitigation program described in section 805 to ensure ongoing sharing of information between forecasters and emergency management officials; and

[(F) making data gathered under this title and post-warning analyses conducted by the National Weather Service or other relevant Administration offices available to researchers.

[(e) TRANSFER OF TECHNOLOGY; MAINTENANCE AND UPGRADES.—

[(1) IN GENERAL.—In carrying out this section, the National Weather Service, in consultation with other relevant Administration offices, shall—

[(A) develop requirements for the equipment used to forecast tsunami, which shall include provisions for multi-purpose detection platforms, reliability and performance metrics, and to the maximum extent practicable how the equipment will be integrated with other United States and global ocean and coastal observation systems, the global earth observing system of systems, global seismic networks, and the Advanced National Seismic System;

[(B) develop and execute a plan for the transfer of technology from ongoing research described in section 806 into the program under this section; and

[(C) ensure that maintaining operational tsunami detection equipment is the highest priority within the program carried out under this title.

[(2) REPORT TO CONGRESS.—

[(A) Not later than 1 year after the date of enactment of this title, the National Weather Service, in consultation with other relevant Administration offices, shall transmit to Congress a report on how the tsunami forecast system under this section will be integrated with other United States and global ocean and coastal observation systems, the global earth observing system of systems, global seismic networks, and the Advanced National Seismic System.

[(B) Not later than 3 years after the date of enactment of this title, the National Weather Service, in consultation with other relevant Administration offices, shall transmit a report to Congress on how technology developed under section 806 is being transferred into the program under this section.

[(f) FEDERAL COOPERATION.—When deploying and maintaining tsunami detection technologies, the Administrator shall seek the assistance and assets of other appropriate Federal agencies.

[(g) ANNUAL EQUIPMENT CERTIFICATION.—At the same time Congress receives the budget justification documents in support of the President's annual budget request for each fiscal year, the Administrator shall transmit to the Committee on Commerce, Science, and Transportation of the Senate and the Committee on Science of the House of Representatives a certification that—

[(1) identifies the tsunami detection equipment deployed pursuant to this title, as of December 31 of the preceding calendar year;

[(2) certifies which equipment is operational as of December 31 of the preceding calendar year;

[(3) in the case of any piece of such equipment that is not operational as of such date, identifies that equipment and describes the mitigation strategy that is in place—

[(A) to repair or replace that piece of equipment within a reasonable period of time; or

[(B) to otherwise ensure adequate tsunami detection coverage;

[(4) identifies any equipment that is being developed or constructed to carry out this title but which has not yet been deployed, if the Administration has entered into a contract for that equipment prior to December 31 of the preceding calendar year, and provides a schedule for the deployment of that equipment; and

[(5) certifies that the Administrator expects the equipment described in paragraph (4) to meet the requirements, cost, and schedule provided in that contract.

[(h) CONGRESSIONAL NOTIFICATIONS.—

[(1) impaired regional forecasting capabilities due to equipment or system failures; and

[(2) significant contractor failures or delays in completing work associated with the tsunami forecasting and warning system.

[(i) REPORT.—Not later than January 31, 2010, the Comptroller General of the United States shall transmit a report to the Committee on Commerce, Science, and Transportation of the Senate and the Committee on Science of the House of Representatives that—

[(1) evaluates the current status of the tsunami detection, forecasting, and warning system and the tsunami hazard mitigation program established under this title, including progress toward tsunami inundation mapping of all coastal areas vulnerable to tsunami and whether there has been any degradation of services as a result of the expansion of the program;

[(2) evaluates the National Weather Service's ability to achieve continued improvements in the delivery of tsunami detection, forecasting, and warning services by assessing policies and plans for the evolution of modernization systems, models, and computational abilities (including the adoption of new technologies); and

[(3) lists the contributions of funding or other resources to the program by other Federal agencies, particularly agencies participating in the program.

[(j) EXTERNAL REVIEW.—The Administrator shall enter into an arrangement with the National Academy of Sciences to review the tsunami detection, forecast, and warning program established under this title to assess further modernization and coverage needs, as well as long-term operational reliability issues, taking into account measures implemented under this title. The review shall also include an assessment of how well the forecast equipment has been integrated into other United States and global ocean and coastal observation systems and the global earth observing system of systems. Not later than 2 years after the date of enactment of this title, the Administrator shall transmit a report containing the National Academy of Sciences' recommendations, the Administrator's responses to the recommendations, including those where the Administrator disagrees with the Academy, a timetable to implement the accepted recommendations, and the cost of implementing all the Academy's recommendations, to the Committee on Commerce, Science, and Transportation of the Senate and the Committee on Science of the House of Representatives.

[(k) REPORT.—Not later than 3 months after the date of enactment of this title, the Administrator shall establish a process for monitoring and certifying contractor performance in carrying out the requirements of any contract to construct or deploy tsunami detection equipment, including procedures and penalties to be imposed in cases of significant contractor failure or negligence.]

[SEC. 805. NATIONAL TSUNAMI HAZARD MITIGATION PROGRAM.

[(a) IN GENERAL.—The Administrator, through the National Weather Service and in consultation with other relevant Administration offices, shall conduct a community-based tsunami hazard mitigation program to improve tsunami preparedness of at-risk areas in the United States and its territories.

[(b) COORDINATING COMMITTEE.—In conducting the program under this section, the Administrator shall establish a coordinating

committee comprising representatives of Federal, State, local, and tribal government officials. The Administrator may establish subcommittees to address region-specific issues. The committee shall—

【(1) recommend how funds appropriated for carrying out the program under this section will be allocated;

【(2) ensure that areas described in section 804(c) in the United States and its territories can have the opportunity to participate in the program;

【(3) provide recommendations to the National Weather Service on how to improve the TsunamiReady program, particularly on ways to make communities more tsunami resilient through the use of inundation maps and other mitigation practices; and

【(4) ensure that all components of the program are integrated with ongoing hazard warning and risk management activities, emergency response plans, and mitigation programs in affected areas, including integrating information to assist in tsunami evacuation route planning.

【(c) PROGRAM COMPONENTS.—The program under this section shall—

【(1) use inundation models that meet a standard of accuracy defined by the Administration to improve the quality and extent of inundation mapping, including assessment of vulnerable inner coastal and nearshore areas, in a coordinated and standardized fashion to maximize resources and the utility of data collected;

【(2) promote and improve community outreach and education networks and programs to ensure community readiness, including the development of comprehensive coastal risk and vulnerability assessment training and decision support tools, implementation of technical training and public education programs, and providing for certification of prepared communities;

【(3) integrate tsunami preparedness and mitigation programs into ongoing hazard warning and risk management activities, emergency response plans, and mitigation programs in affected areas, including integrating information to assist in tsunami evacuation route planning;

【(4) promote the adoption of tsunami warning and mitigation measures by Federal, State, tribal, and local governments and nongovernmental entities, including educational programs to discourage development in high-risk areas; and

【(5) provide for periodic external review of the program.

【(d) SAVINGS CLAUSE.—Nothing in this section shall be construed to require a change in the chair of any existing tsunami hazard mitigation program subcommittee.】

【SEC. 806. TSUNAMI RESEARCH PROGRAM.

【The Administrator shall, in consultation with other agencies and academic institutions, and with the coordinating committee established under section 805(b), establish or maintain a tsunami research program to develop detection, forecast, communication, and mitigation science and technology, including advanced sensing techniques, information and communication technology, data collection, analysis, and assessment for tsunami tracking and numerical forecast modeling. Such research program shall—

【(1) consider other appropriate research to mitigate the impact of tsunami;

[(2) coordinate with the National Weather Service on technology to be transferred to operations;

[(3) include social science research to develop and assess community warning, education, and evacuation materials; and

[(4) ensure that research and findings are available to the scientific community.]

[SEC. 807. GLOBAL TSUNAMI WARNING AND MITIGATION NETWORK.

[(a) INTERNATIONAL TSUNAMI WARNING SYSTEM.—The Administrator, through the National Weather Service and in consultation with other relevant Administration offices, in coordination with other members of the United States Interagency Committee of the National Tsunami Hazard Mitigation Program, shall provide technical assistance and training to the Intergovernmental Oceanographic Commission, the World Meteorological Organization, and other international entities, as part of international efforts to develop a fully functional global tsunami forecast and warning system comprising regional tsunami warning networks, modeled on the International Tsunami Warning System of the Pacific.

[(b) INTERNATIONAL TSUNAMI INFORMATION CENTER.—The Administrator, through the National Weather Service and in consultation with other relevant Administration offices, in cooperation with the Intergovernmental Oceanographic Commission, shall operate an International Tsunami Information Center to improve tsunami preparedness for all Pacific Ocean nations participating in the International Tsunami Warning System of the Pacific, and may also provide such assistance to other nations participating in a global tsunami warning system established through the Intergovernmental Oceanographic Commission. As part of its responsibilities around the world, the Center shall—

[(1) monitor international tsunami warning activities around the world;

[(2) assist member states in establishing national warning systems, and make information available on current technologies for tsunami warning systems;

[(3) maintain a library of materials to promulgate knowledge about tsunami in general and for use by the scientific community; and

[(4) disseminate information, including educational materials and research reports.

[(c) DETECTION EQUIPMENT; TECHNICAL ADVICE AND TRAINING.—In carrying out this section, the National Weather Service—

[(1) shall give priority to assisting nations in identifying vulnerable coastal areas, creating inundation maps, obtaining or designing real-time detection and reporting equipment, and establishing communication and warning networks and contact points in each vulnerable nation;

[(2) may establish a process for transfer of detection and communication technology to affected nations for the purposes of establishing the international tsunami warning system; and

[(3) shall provide technical and other assistance to support international tsunami programs.

[(d) DATA-SHARING REQUIREMENT.—The National Weather Service, when deciding to provide assistance under this section, may take into consideration the data sharing policies and practices of

nations proposed to receive such assistance, with a goal to encourage all nations to support full and open exchange of data.】

【SEC. 8. AUTHORIZATION OF APPROPRIATIONS.

【There are authorized to be appropriated to the Administrator to carry out this title—

【(1) \$25,000,000 for fiscal year 2008, of which—

【(A) not less than 27 percent of the amount appropriated shall be for the tsunami hazard mitigation program under section 805; and

【(B) not less than 8 percent of the amount appropriated shall be for the tsunami research program under section 806;

【(2) \$26,000,000 for fiscal year 2009, of which—

【(A) not less than 27 percent of the amount appropriated shall be for the tsunami hazard mitigation program under section 805; and

【(B) not less than 8 percent of the amount appropriated shall be for the tsunami research program under section 806;

【(3) \$27,000,000 for fiscal year 2010, of which—

【(A) not less than 27 percent of the amount appropriated shall be for the tsunami hazard mitigation program under section 805; and

【(B) not less than 8 percent of the amount appropriated shall be for the tsunami research program under section 806;

【(4) \$28,000,000 for fiscal year 2011, of which—

【(A) not less than 27 percent of the amount appropriated shall be for the tsunami hazard mitigation program under section 805; and

【(B) not less than 8 percent of the amount appropriated shall be for the tsunami research program under section 806; and

【(5) \$29,000,000 for fiscal year 2012, of which—

【(A) not less than 27 percent of the amount appropriated shall be for the tsunami hazard mitigation program under section 805; and

【(B) not less than 8 percent of the amount appropriated shall be for the tsunami research program under section 806.】