Make America's Swamps Great Again

An opinion-editorial by

Kevin G. Coulton, PE , CFM

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June 17-21, 2018


Legislative Outline for
Rebuilding Infrastructure
in America
THE WHITE HOUSE
THE WHITE HOUSE
WASHINGTON
May 24, 2018
Mr. Kevin G. Coulton
Troutdale, Oregon
Dear Mr. Coulton,
Thank you for your thoughtful suggestions on how to address important issues facing our Nation. I am honored to work on behalf of all Americans to grow our economy, protect our citizens, and strengthen American leadership around the world.
When America is united, there is no challenge too great. Together we will prosper, and we will get the job done. Thank you again for your suggestions.
Sincerely,

"The Trump Administration has announced an "America's Infrastructure First" policy that supports investments in pressing domestic infrastructure needs.

While I understand and am supportive of the need to improve our Nation's infrastructure, I am concerned that the new administration may end up draining more than just the "political swamp" to accomplish this goal and place new and rebuilt infrastructure at risk from natural disasters…especially flooding, the most costly natural disaster in the America."

“America was first made great because of our natural resources and, in part, by the draining of swamps (the bogs, marshes, and frequently flooded areas, collectively known as wetlands) to allow navigation, agriculture, transportation, and land development to occur and our Nation to prosper.”

West front of Capitol, July 1860

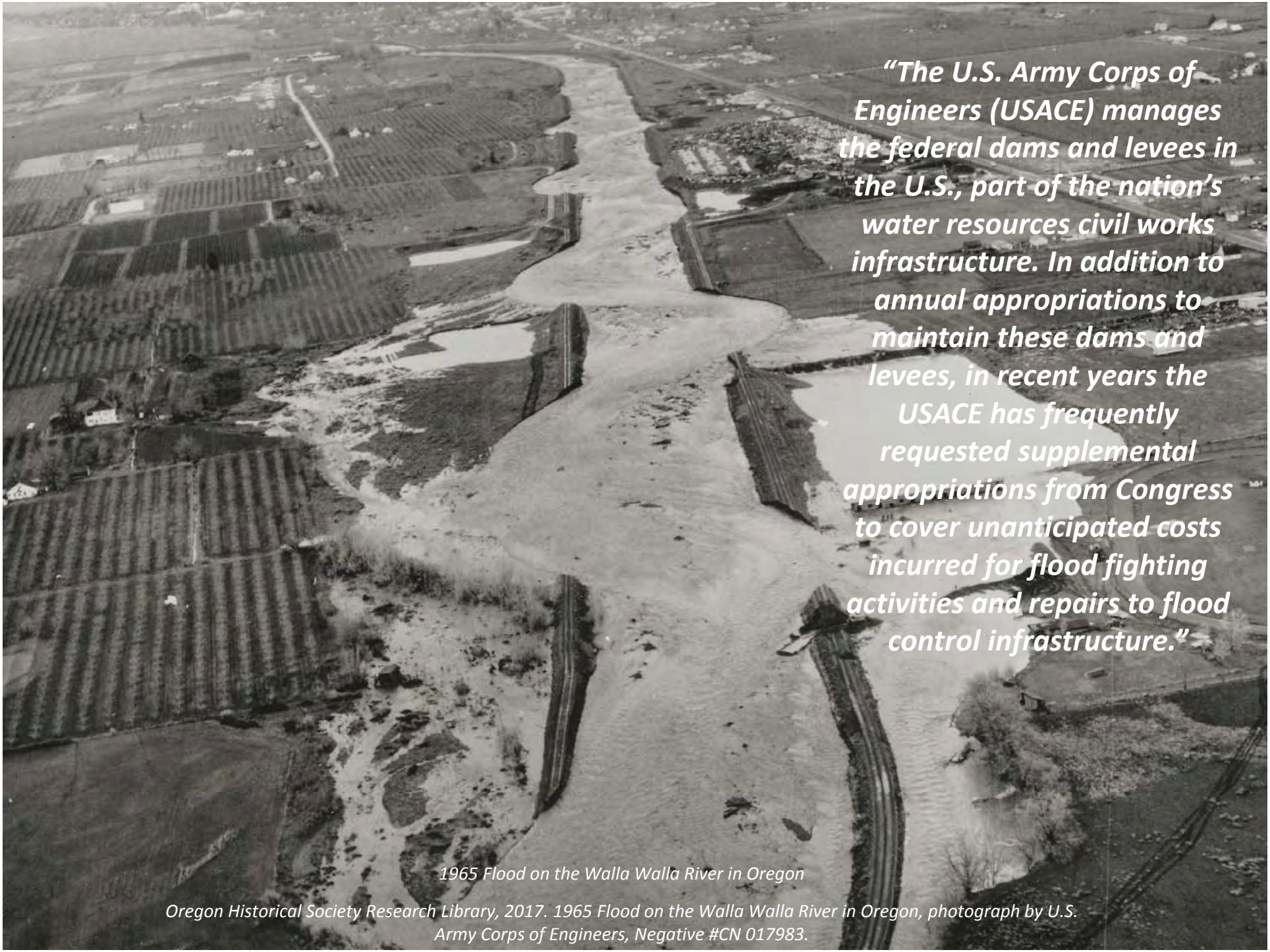
Library of Congress, 2017. West front of Capitol, July 1860, Prints & Photographs Online Catalog, http://www.loc.gov/pictures/item/2009631499/

Hawkins, D., 2014. "No, D.C. isn't really built on a swamp", The Washington Post, August 29. https://www.washingtonpost.com/posteverything/wp/2014/08/29/no-dc-isnt-really-built-on-a-swamp/?utm_term=.c812bc038da7

"Ironically, we drained and filled swamps to build some of our first political infrastructure. In the early days of Washington, D.C. a flood-prone area below Capitol Hill was drained , and the U.S. Army Corps of Engineers (USACE) dredged the Potomac River in the 1870s, and used dredged sediment to fill floodplain wetlands. Now portions of the National Mall , including the Capitol Reflecting Pool, are located where natural swamps used to be."

“This conversion of the natural to built environment is characteristic of our perception of “infrastructure”; i.e., over the eons, human society has attempted to dominate and control nature to survive, then subsist, and now hopefully flourish.”

"As a practicing civil engineer I was taught to design infrastructure and for much of my career I associated this with the tangible concrete and steel projects built by engineers that we see around us. This definition of infrastructure is supported by the American Society of Civil Engineers (ASCE)—which I am a member—that publishes a Report Card for America's Infrastructure every four years."



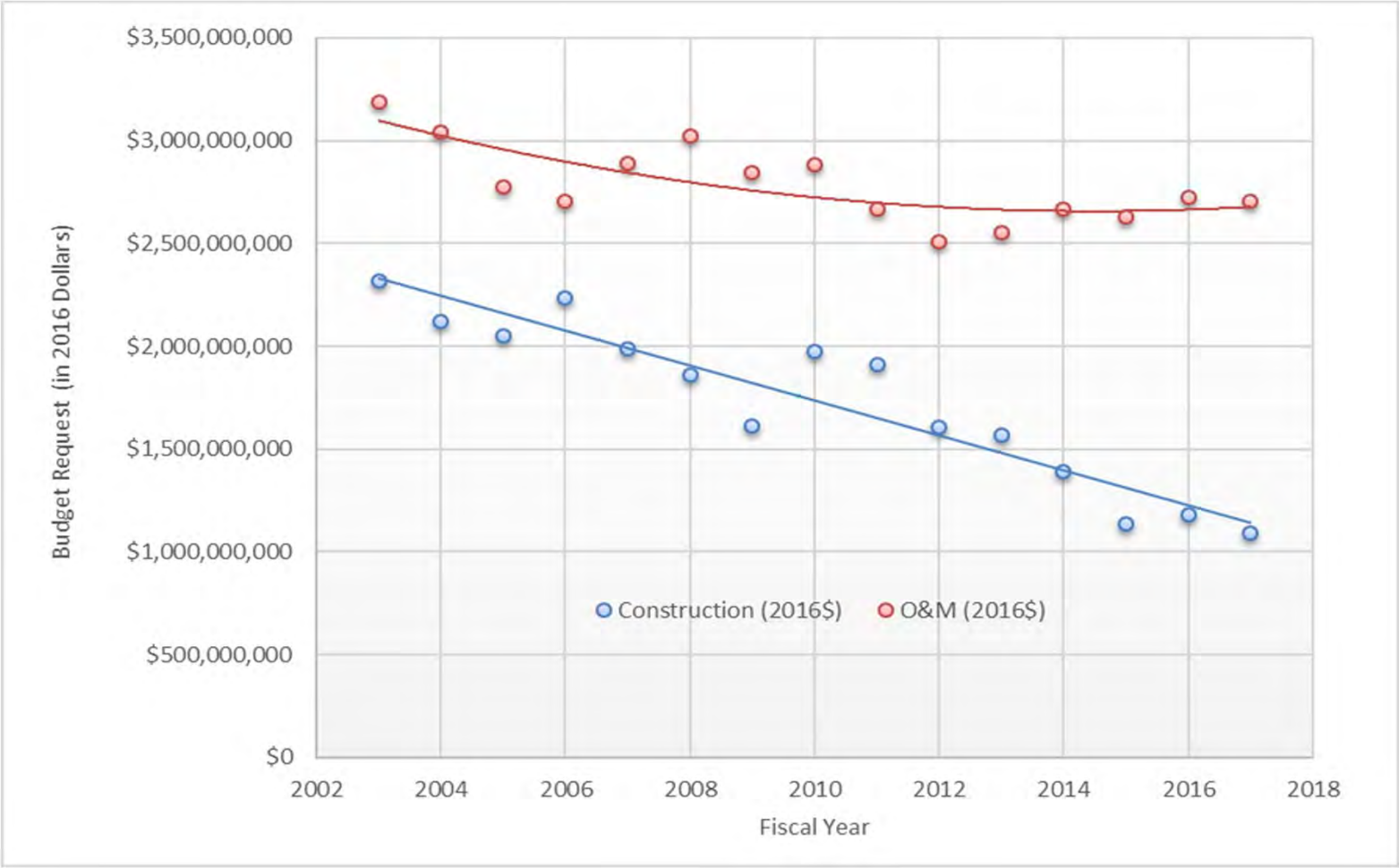
"The U.S. Army Corps of Engineers (USACE) manages the federal dams and levees in the U.S., part of the nation's water resources civil works infrastructure. In addition to annual appropriations to maintain these dams and levees, in recent years the USACE has frequently requested supplemental appropriations from Congress to cover unanticipated costs incurred for flood fighting activities and repairs to flood control infrastructure."

1965 Flood on the Walla Walla River in Oregon

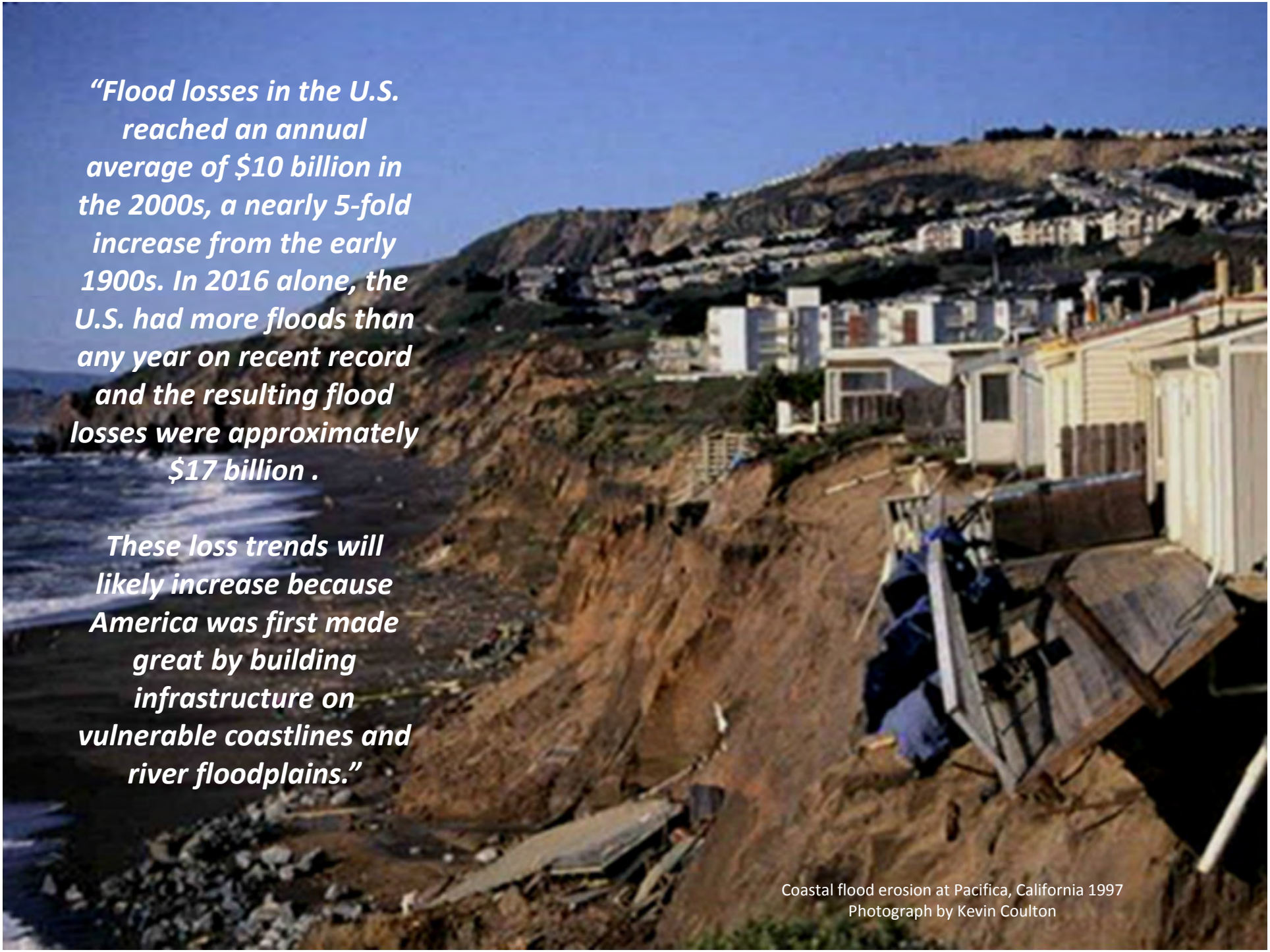
Oregon Historical Society Research Library, 2017. 1965 Flood on the Walla Walla River in Oregon, photograph by U.S. Army Corps of Engineers, Negative #CN 017983.

“The economic value of this infrastructure is declining because the costs to fix, operate, and maintain what is on the ground is increasing to make these civil works…work.”

"A review of USACE civil works budget requests from Fiscal Years 2003 through 2017 indicates construction budgets have been steadily declining while operation and maintenance (O&M) budgets are on an uptick in recent years. This O&M trend may be much higher because nonfederal local sponsors own much of this infrastructure after it is constructed and they are responsible for its upkeep."



Civil Works budget of the U.S. Army Corps of Engineers, annual fiscal year press books. http://cdm16021.contentdm.oclc.org/cdm/ref/collection/p16021coll6/id/42

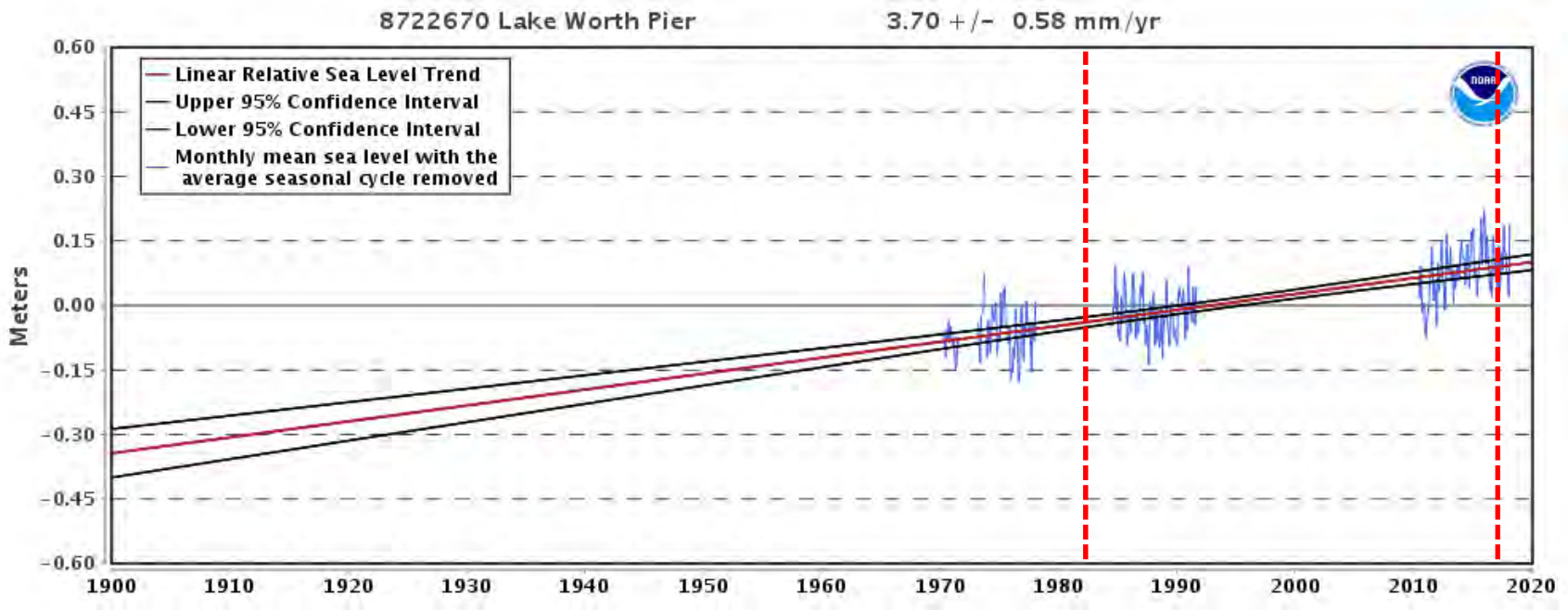


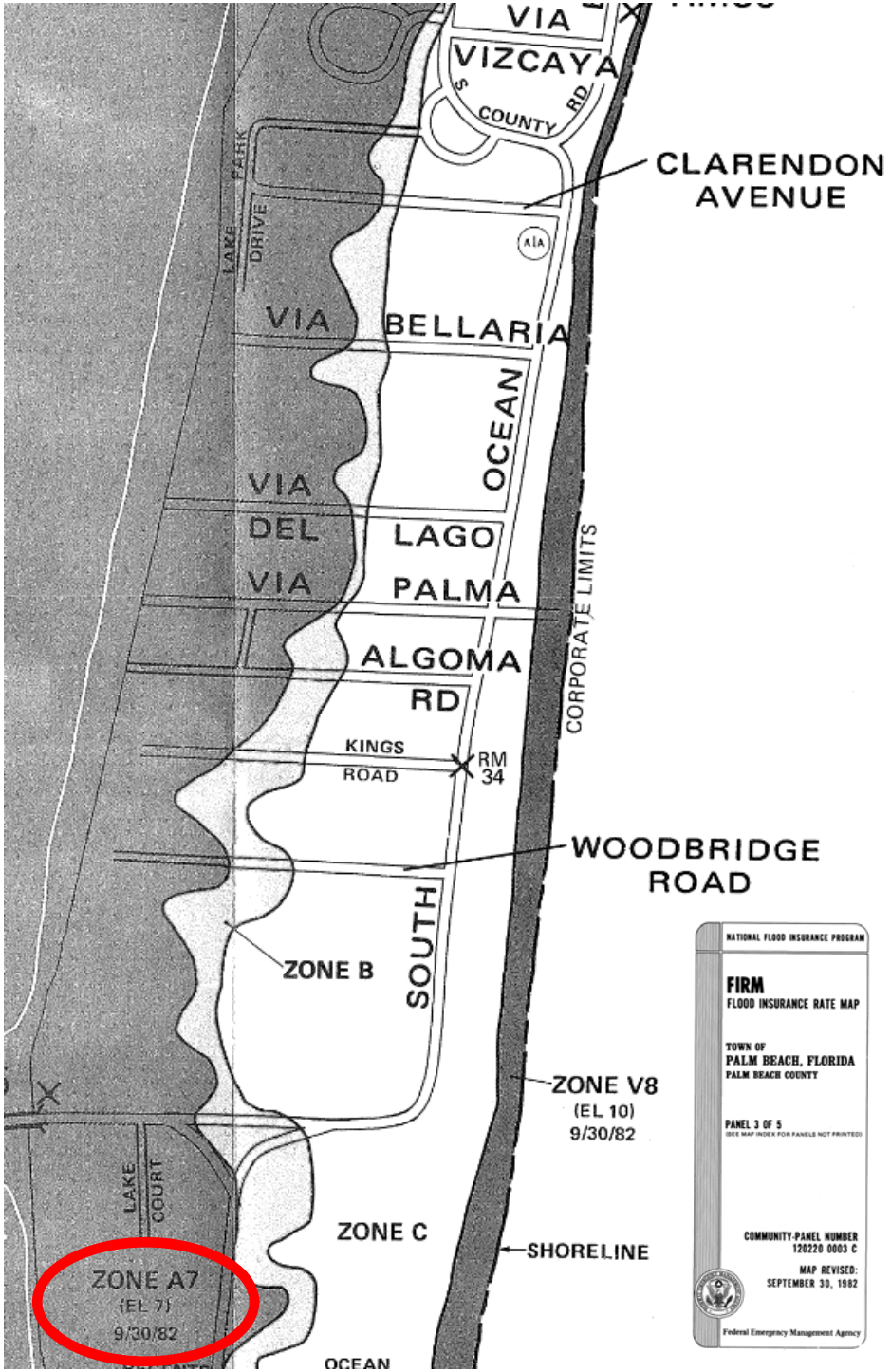
Coastal flood erosion at Pacifica, California 1997
Photograph by Kevin Coulton

“FEMA flood hazard mapping has significant limitations because it is based on existing conditions to establish actuarial rates for flood insurance and it does not include projected future conditions, and many maps are outdated.”

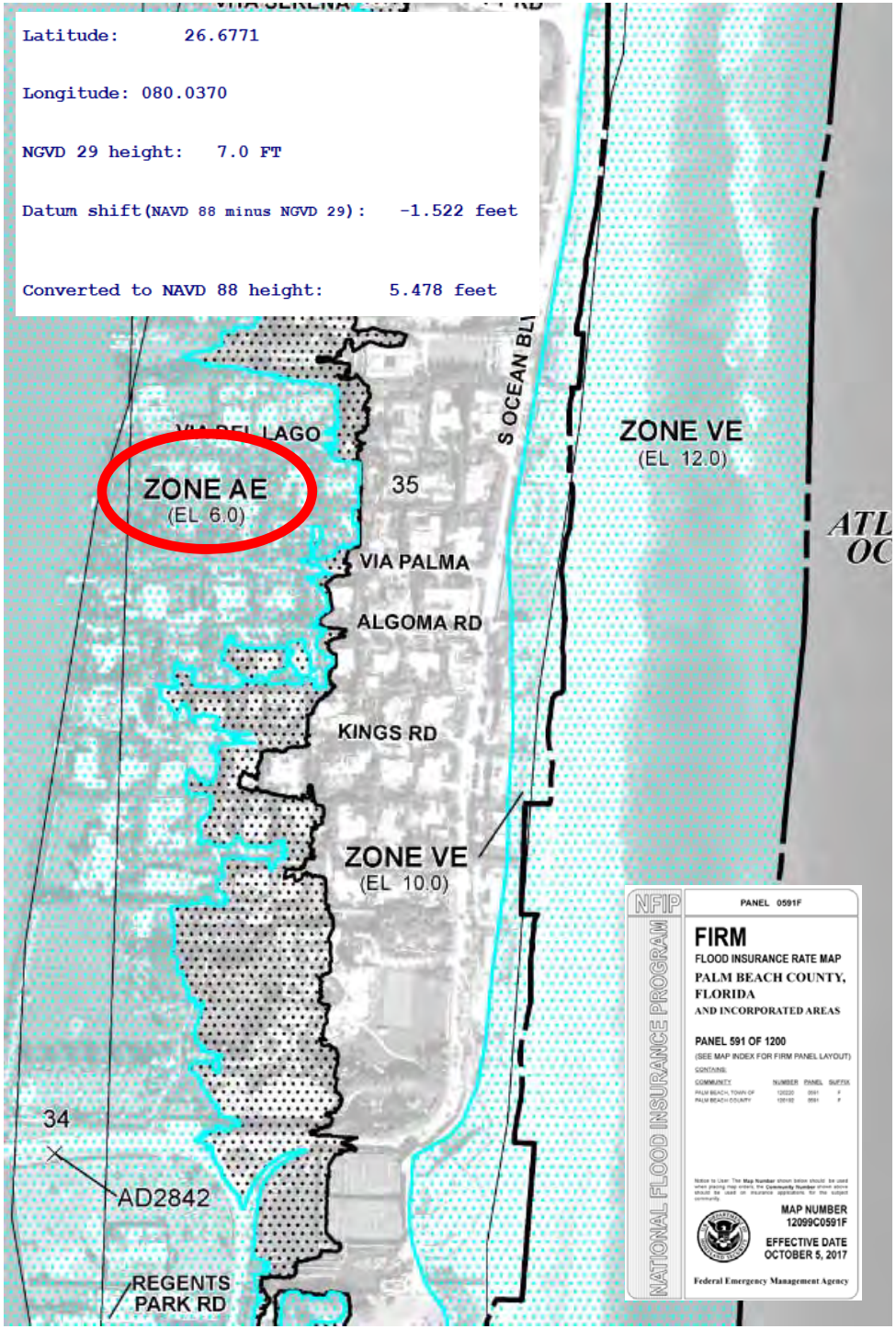

“For example, the President himself owns a significant amount of coastal infrastructure and his Mar-a-Lago estate in Florida is located in a FEMA flood hazard zone that was established back in 1982.”

"The National Oceanic and Atmospheric Administration (NOAA) has documented a rise in mean sea level of nearly a half foot in this area since the FEMA map was published 35 years ago and an accelerating rise in local sea levels, combined with more frequent rain, high tide, and storm surge events , may lead to an increasing frequency of flooding for this region in the years to come."




VIA
VIZCAYA
S. COUNTY RD.
CLARENDON AVENUE
LAKE PARK DRIVE
A1A
VIA BELLARIA
OCEAN
VIA DEL LAGO
VIA PALMA
ALGOMA RD
KINGS ROAD
RM 34
CORPORATE LIMITS
WOODBRIDGE ROAD
SOUTH
ZONE B
ZONE V8
(EL 10)
9/30/82
LAKE COURT
ZONE C
SHORELINE
ZONE A7
(EL 7)
9/30/82
OCEAN

NATIONAL FLOOD INSURANCE PROGRAM
FIRM
FLOOD INSURANCE RATE MAP
TOWN OF
PALM BEACH, FLORIDA
PALM BEACH COUNTY
PANEL 3 OF 5
(SEE MAP INDEX FOR PANELS NOT PRINTED)
COMMUNITY-PANEL NUMBER
120220 0003 C
MAP REVISED:
SEPTEMBER 30, 1982
Federal Emergency Management Agency

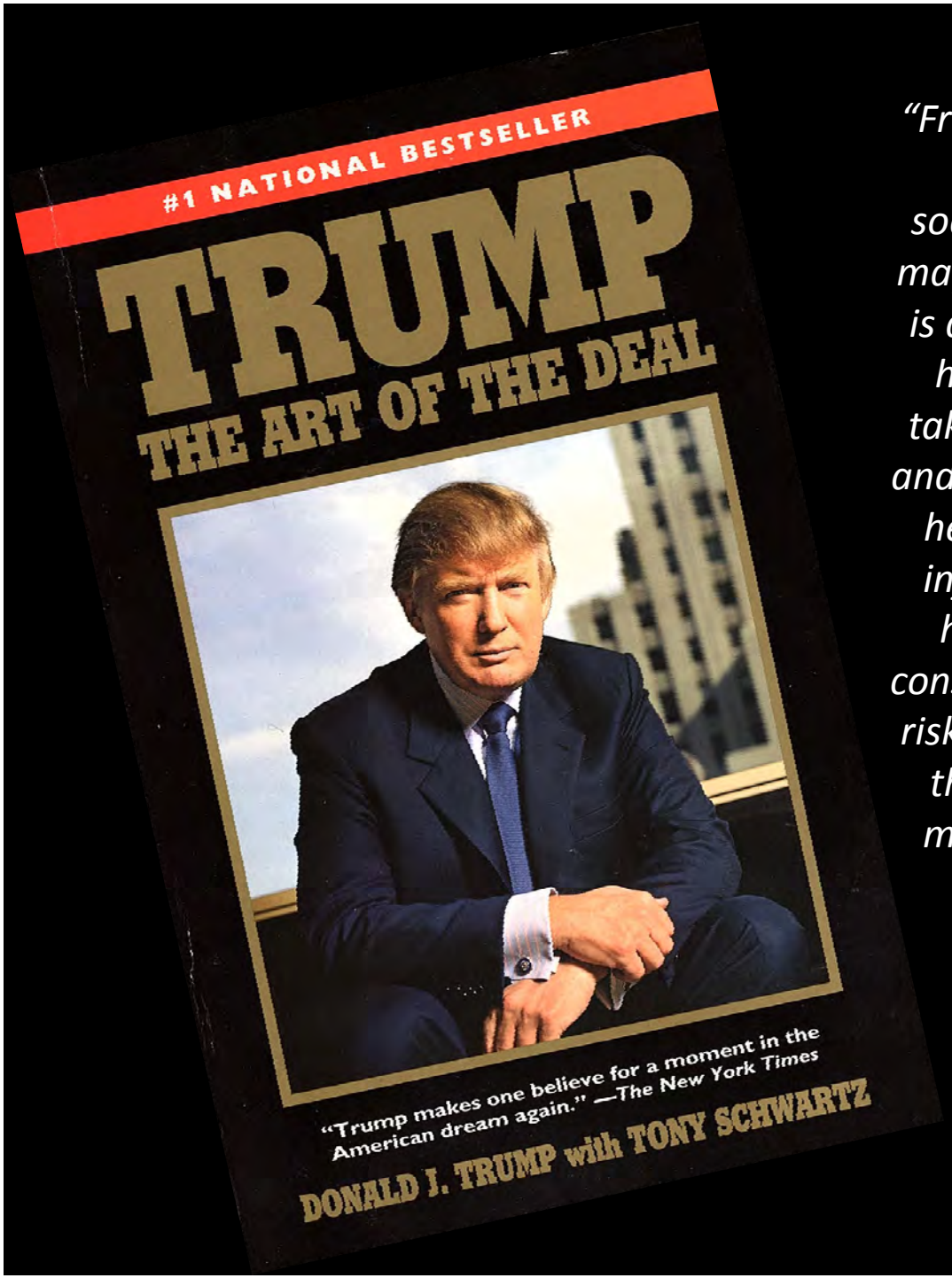

Latitude: 26.6771
Longitude: 080.0370
NGVD 29 height: 7.0 FT
Datum shift(NAVD 88 minus NGVD 29): -1.522 feet
Converted to NAVD 88 height: 5.478 feet
S OCEAN BL
ZONE VE
(EL 12.0)
VIA DEL LAGO
ZONE AE
(EL 6.0)
35
VIA PALMA
ALGOMA RD
KINGS RD
ZONE VE
(EL 10.0)
34
AD2842
REGENTS PARK RD
NFIP
NATIONAL FLOOD INSURANCE PROGRAM
PANEL 0591F
FIRM
FLOOD INSURANCE RATE MAP
PALM BEACH COUNTY, FLORIDA
AND INCORPORATED AREAS
PANEL 591 OF 1200
(SEE MAP INDEX FOR FIRM PANEL LAYOUT)
CONTAINS:
COMMUNITY
NUMBER
PANEL
SUFFIX
PALM BEACH, TOWN OF
120220
0591
F
PALM BEACH COUNTY
120192
0591
F
MAP NUMBER
12099C0591F
EFFECTIVE DATE
OCTOBER 5, 2017
Federal Emergency Management Agency

"In the early 1900s, Allen Hazen, one of America's first flood control experts, and a Vice President of ASCE, wrote in 1930, "the increase in the amount of damage from floods has been occasioned more by the increased occupation of areas that are sometimes flooded than by any increase in the volume of flood flows."

Hazen, A., 1930. Flood Flows: A Study of Frequencies and Magnitudes, John Wiley & Sons, New York NY, 199 p, page 1.

“An immense amount of infrastructure has since been built in the U.S. to control flooding, yet flood losses are increasing and the cost to simply maintain this infrastructure is also increasing, to protect what we have built in swamps and floodplains.

Furthermore, the benefits of our flood control infrastructure may be diminishing as design assumptions from decades ago become invalidated by a changing climate.”



"From a pure business standpoint, it seems that the economic and societal value of these investments may be declining. The new President is a businessman and, as he says in his book, The Art of the Deal, he takes a very conservative approach and always anticipates the worst. As he leads the nation to rebuild our infrastructure, I would encourage him to anticipate the worst and consider an approach to reduce flood risk through infrastructure spending that costs less to maintain and is more resilient to future flooding."

“But what should we do?”

“Again, from the President’s book, “Sometimes your best investments are the ones you don’t make.”

I agree, and some of the best flood risk reduction infrastructure is already available to us free of charge and involves working with the natural systems of forests, floodplains—and, yes, swamps—that have inherent natural abilities to slow the movement and reduce the force of water as it moves towards the infrastructure that we have traditionally valued.”

“We need to view Nature as our business partner.

Working with nature, instead of against it, will lead to built infrastructure that is more resilient to future flooding and other catastrophes.

This mindset of natural, or green, infrastructure is not a new concept and has been gaining interest, in large part due to the shortcomings of built infrastructure that we have been witnessing in recent decades.”


GMC
100
FLOODPLAINS ARE "GREEN" RESERVOIRS™
...help protect the natural and beneficial functions of floodplains...

"The ASCE (or ASFPM?) should begin to also grade the condition of our Nation's floodplains and their natural ability to store and convey floodwaters to reduce flood risk."

2021

INFRASTRUCTURE REPORT CARD

"With an estimated 20 million acres of floodplain area in the U.S. …"

9-2002

Review of: Riverine Flood Plains: Present State and Future Trends

Klement Tockner

Jack Arthur Stanford
The University of Montana, jack.stanford@umontana.edu

Table 1 Stream order, estimated number of streams, average and total length of rivers and streams, average riparian width and total floodplain surface area in the USA (modified from Leopold *et al.* 1964).

Stream order	*Number*	*Average length (km)*	*Total length (km)*	*Estimated floodplain width (m)*	*Floodplain surface area (km²)*
1	1 570 000	1.6	2 526 130	3	7578
2	350 000	3.7	1 295 245	6	7771
3	80 000	8.5	682 216	12	8187
4	18 000	19.3	347 544	24	8341
5	4200	45.1	189 218	48	9082
6	950	103.0	97 827	96	9391
7	200	236.5	47 305	192	9082
8	41	543.8	22 298	384	8562
9	8	1250.2	10 002	768	7681
10	1	2896.2	2896	1536	4449

Tockner, K, and J.A. Stanford, 2002. Review of: Riverine flood plains: present state and future trends, Biological Sciences Faculty Publications, Paper 166, University of Montana. http://scholarworks.umt.edu/biosci_pubs/166

Global Environmental Change 26 (2014) 152–158

Contents lists available at ScienceDirect

Global Environmental Change

journal homepage: www.elsevier.com/locate/gloenvcha

Changes in the global value of ecosystem services

Robert Costanza [a,*], Rudolf de Groot [b], Paul Sutton [c,d], Sander van der Ploeg [b], Sharolyn J. Anderson [d], Ida Kubiszewski [a], Stephen Farber [e], R. Kerry Turner [f]

[a] Crawford School of Public Policy, Australian National University, Canberra, Australia
[b] Environmental Systems Analysis Group, Wageningen University, Wageningen, The Netherlands
[c] Department of Geography, University of Denver, United States
[d] Barbara Hardy Institute and School of the Natural and Built Environments, University of South Australia, Australia
[e] University of Pittsburgh, United States
[f] University of East Anglia, Norwich, UK

Biome	Area (e6 ha)		Change	Unit values 2007$/ha/yr		Change
	1997	2011	2011-1997	1997	2011	2011-1997
Marine	**36,302**	**36,302**	0	796	1,368	572
Open Ocean	**33,200**	**33,200**	0	348	660	312
Coastal	**3,102**	**3,102**	0	5,592	8,944	3,352
Estuaries	180	**180**	0	31,509	28,916	-2,593
Seagrass/Algae Beds	200	234	34	26,226	28,916	2,690
Coral Reefs	62	28	-34	8,384	352,249	343,865
Shelf	2,660	**2,660**	0	2,222	2,222	0
Terrestrial	**15,323**	**15,323**	0	1,109	4,901	3,792
Forest	**4,855**	4,261	-594	1,338	3,800	2,462
Tropical	1,900	1,258	-642	2,769	5,382	2,613
Temperate/Boreal	2,955	3,003	48	417	3,137	2,720
Grass/Rangelands	**3,898**	4,418	520	321	4,166	3,845
Wetlands	**330**	188	-142	20,404	140,174	119,770
Tidal Marsh/Mangroves	165	128	-37	13,786	193,843	180,057
Swamps/Floodplains	165	60	-105	27,021	25,681	-1,340
Lakes/Rivers	**200**	**200**	0	11,727	12,512	785
Desert	**1,925**	2,159	234	-	-	0
Tundra	**743**	433	-310	-	-	0
Ice/Rock	**1,640**	**1,640**	0	-	-	0
Cropland	**1,400**	1,672	272	126	5,567	5,441
Urban	**332**	352	20	-	6,661	6,661
Total	**51,625**	**51,625**	0			

"…and a potential value of $10,000 per acre per year in ecosystem services provided by swamps and floodplains…"

Costanza, R., R. de Groot, P. Sutton, S. van der Ploeg, S. J. Anderson, I. Kubiszewski, S. Farber, and R. K. Turner, 2014. Changes in the global value of ecosystem services, Global Environmental Change 26, pages 152–158. http://www.sciencedirect.com/science/article/pii/S095937801400068 5

"…we may have $200 billion per year in natural infrastructure available to help us reduce America's flood risk…

…while making America's swamps great again."

Vol. 27 No. 2 March/April 2017

Make America's Swamps Great Again

An opinion-editorial by Kevin G. Coulton, PE , CFM

The Trump Administration has announced an "America's Infrastructure First" policy that supports investments in pressing domestic infrastructure needs[1]. While I understand and am supportive of the need to improve our Nation's infrastructure, I am concerned that the new administration may end up draining more than just the "political swamp" to accomplish this goal and place new and rebuilt infrastructure at risk from natural disasters...especially flooding, the most costly natural disaster in America[2].

America was first made great because of our natural resources and, in part, by the draining of swamps (the bogs, marshes, and frequently flooded areas, collectively known as wetlands) to allow navigation, agriculture, transportation, and land development to occur and our Nation to prosper. In the early 1600's, the land area comprising the eventual United States had approximately 221 million acres of wetlands[3]; now only about half of these important resources remain[4].

Ironically, we drained and filled swamps to build some of our first political infrastructure. In the early days of Washington, D.C. a flood-prone area below Capitol Hill was drained[5], and the U.S. Army Corps of Engineers (USACE) dredged the Potomac River in the 1870s, and used dredged sediment to fill floodplain wetlands. Now portions of the National Mall[6], including the Capitol Reflecting Pool, are located where natural swamps used to be.

West front of Capitol, July 1860[6]

[1]Trump Pence Make America Great Again. 2017. Infrastructure: Donald J. Trump's Vision
[2]National Flood Insurance Program. 2010. Flooding: Our Nation's Most Frequent and Costly Natural Disaster. March.
[3]Dahl, T.W., and G.J. Allord. Technical Aspects of Wetlands: History of Wetlands in the Conterminous United States. National Water Summary on Wetland Resources. United States Geological Survey Water Supply Paper 2425.
[4]Dahl, T.E., 2011. Status and Trends of Wetlands in the Conterminous United States 2004 to 2009. U.S. Department of the Interior, Fish & Wildlife Service Report to Congress, Washington, D.C. 108 pp. Page 57.
[5]Hawkins, D., 2014. "No, D.C. isn't really built on a swamp". The Washington Post. August 29.
[6]Histories of the National Mall. 2017. Histories of the National Mall. "Why do people say the National Mall is built on a swamp?". The Roy Rosenzweig Center for History and New Media and George Mason University.

What's New

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Free 2D hydraulic modeling web meeting to be held Jan. 25 >>

Make America's Swamps Great Again

Thursday, January 11, 2018

ASFPM member Kevin Coulton, of Troutdale, Oregon, is serious about getting his message out on natural infrastructure being coupled with traditional infrastructure when protecting people and property from flood risks. That's why he wrote Make America's Swamps Great Again, along with a letter to President Trump, urging him to "consider my opinions regarding the value and benefit of natural infrastructure for flood risk reduction." If you'd like to contact Kevin, he can be reached at kevin.coulton@gmail.com.

Budget cutters threaten to end agency's 115-year tradition of high-quality data

By KEVIN G. COULTON

IN MY OPINION

As the news is filled with stories of flooding and sporadic earthquake tremors, deliberations are being made to destroy the valuable evidence the public needs for informed decisions concerning natural hazards and our quality of life.

The new chairman of the House Budget Committee wants to abolish the 115-year-old U.S. Geological Survey (USGS).

Most of us may associate the USGS only with the topographic maps we use during weekend camping or hiking trips. However, this agency's services extend much deeper into our daily lives than most people know.

As the primary federal earth-science agency, the USGS operates environmental monitoring stations across the country. Data from these stations provide engineers and scientists with basic natural resource evidence necessary to make informed decisions for the public good. Besides providing valuable information on earthquakes and

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monitoring and

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Along with water-quantity information, the USGS has collected water-quality data at more than 12,000 sites in Oregon.

The health of Oregon's — and the nation's — growing population depends on accurate knowledge of our freshwater resources. The protection of property investments and human safety requires an early warning of potential flood hazards. To a large extent this understanding comes from USGS data.

"Well, this is all good to know," you may say, "but how does something as obscure as USGS monitoring data really affect me?" We need only look as far as your typical weekday morning to find the answers:

6:15 a.m. — The alarm goes off.

6:30 a.m. — Make your coff

from the faucet —

from

as determined by USGS streamflow data).

7:15 a.m. — Drive to work (if your commute takes you over a waterway bridge or culvert, the opening of the structure was designed to safely convey a potential flood flow — estimated using USGS streamflow data).

8:05 a.m. — Power the computer (hydropower operations rely on gauges to monitor the elevation of water in reservoirs and guide the production of electricity — 31 such USGS gauges operate in Oregon).

12:10 p.m. — Oyster stew for lunch (the Oregon shellfish industry is dependent on USGS streamflow and water quality data to determine when water-quality conditions exceed standards in shellfish harvest areas).

With a realization of how USGS activities touch our daily lives, should we be eager to abolish an agency that has

work for more th

need to be considered in this budgeting equation.

For example, in just the past five years, volcanic monitoring of Mt. Pinatubo in the Philippines by the USGS resulted in the early evacuation of civilians and the United States' Clark Air Base prior to the June 1991 eruption. This monitoring saved hundreds of millions of dollars in U.S. military equipment, as well as lives.

Who will take over and manage the century-old collection of environmental data if the USGS is abolished? USGS data on these environmental features are respected by all who use them as unbiased

quality. Proposed

GUIDELINES

The "in my opinion" column is available to readers desiring to comment on current issues.

Commentaries may be on any subject, but those dealing with local or personal issues will receive priority.

Views opposing those expressed in individual columns are welcome, but should stand independently of the original

is should be about 250 ve double-spaced pages if They must not have been viously and must be subively to The Oregonian. the authors after they

will be the only pay-

subject to editing.

issions to "In my Oregonian op-ed soc- Broadway, Portland n can be faxed to 294- electronic mail to nerve.com.

ersion page edit-

THE OREGONIAN, SATURDAY, JANUARY 25, 1969

Leaky lessons about our slippery streets

The only drops that fell from rain's fury didn't just make our roads hazardous; they fouled our water with a gray

H

more fluids out of more asphalt. Several years ago,

WE ARE WATER

Pollution fighter's motto:

The water within us comes from the water around us

B

IN MY OPINION

Kevin G. Coulton

The next 100-year flood could come next spring

By KEVIN G. COULTON

IN MY OPINION

As the floodwaters recede, hydrologists will begin to gather their data on the recent flood flows and elevations and crunch the numbers to determine the magnitude of the flood of 1996 by assigning a return period to the event; i.e., was this a 100-year flood or a 200-year flood?

The public, and especially new Oregonians or those who do not know about the 1964 floods, will latch onto this soon-to-be-published proclamation, and as carpets dry out and court come home, they will think this is a once-in-a-lifetime experience; this will never happen again for 100 years.

In fact, this same flood could happen again in February 1997 or February 1998 or February 1999. All we need are similar weather conditions and plenty of news coverage, and we'll have the same drama as we have just experienced.

mud has been burned into

In

of 1968.

However, at the local level, it becomes very difficult to balance the human drive to develop in the tempting flat and accessible floodplain lands (to increase the community tax base) against preserving these lands so that the once-in-a-100-year flood can ride through, causing limited damage (to preserve the community tax base).

As I observed the recent flooding from a plane over the Willamette Valley and from a helicopter over Tillamook County, it was interesting to note the significant number of new homes and businesses engulfed by the muddy floodwaters.

Since the 100-year floodplain is a minimum standard, local communities can be more stringent than FEMA to protect their citizens' lives and property. In addition, there is uncertainty in the statistical information these maps portray.

of this uncertainty comes from the

hat many of the FEMA floodplain

laries are outdated. Continued develnt in our watersheds has resulted in ment and efficient storm sewers that runoff to the floodplains. By increasthe rate and volume of runoff from urnation, a statistical 100-year floodplain value from 1960 may be much less than same statistical value today, and correndingly, today's true 100-year floodplain y be larger than we believe.

When the flood damage figures come in m the flood of '96, let's do the math and mpare the benefits of increasing commuty income from risky floodplain developent to the financial losses uninsured omeowners, businesses and we, the taxpayrs, face. We really need to think about whether it is prudent to continue to develop within our floodplains and build right down to that sacred, yet uncertain, 100-year floodplain line on the map.

As Sir Alan P. Herbert wrote in the poem "Water," "Nature is blamed for failings that are Man's and well-run rivers have to change their plans."

We cannot completely blame nature for our misfortunes. We must learn from the past and plan for history to repeat itself because, on the Willamette River, the 100-year flood may be lapping at our doors again in next year.

Kevin G. Coulton

Oregonian February 14, 1996

An editorial submitted to the members of the 107th Congress U.S. House of Representatives
October 15, 2002

Homeland Security can start on America's floodplains.

By Kevin G. Coulton, P.E.

I recently refinanced my home. While the senior escrow manager sat politely across the table from me, I rapidly scanned the ream of paperwork and chuckled to myself as I noticed the $8.50 flood certification fee in the estimated closing statement. As a consulting water resource engineer, I had been deliberate in buying a home on high ground to avoid living near floodplains, which I have often mapped for the Federal Emergency Management Agency (FEMA) during my career. Based on my review of flood hazard maps for my neighborhood, I feel confident that the certification fee I paid would prove to the bank that my house is not located in a regulatory flood zone. But how confident should I be?

Since the inception of the National Flood Insurance Program (NFIP) in 1968, FEMA has mapped over 100 million acres of floodplains in the U.S. These floodplains are associated with the infamous 100-year flood. To avoid the misconception that these natural disasters will only pester every other generation of homeowners—once a century—FEMA now calls these floods the 1-percent-annual-chance flood. Or, in other words, a home located within a mapped flood hazard area has a 26-percent chance of being damaged during the term of a 30-year mortgage.

FEMA estimates $1 billion in property losses are avoided each year because flood hazard maps are central to many local land use regulations. However in 2001 alone, FEMA still paid out $1.5 billion to settle flood insurance claims.

The primary purpose of the maps is to define existing flood hazards so insurance companies can establish actuarial rates for flood insurance. Although well intended, this has led to a hodge-podge of out dated flood hazard "snap shots" over the 34 years mapping has been incrementally funded under the NFIP.

Since 1988, new and updated maps have been funded by premiums collected from about 4 million flood insurance policy holders. In my home state of Oregon, there are about 26,000 policyholders with $3.8 billion of insurance in force. However, about 75-percent of the nation's maps remain over ten years old and, in Oregon, 80-percent of the maps are over 11 years old.

Willamette River flooding near Newberg, Oregon February 10, 1996 © Kevin G. Coulton

To remedy this, FEMA has requested $351 million in the President's 2003 budget proposal to update and expand the 100,000 map panels that show the nation's former hazard areas. The goal of FEMA's Map to develop up-to-date flood

The appropriations bill for FEMA's funding (S.2797) on October 10, 2002 before the House

Questions?

Kevin Coulton
kevin.coulton@gmail.com