

Public Health's Waterloo

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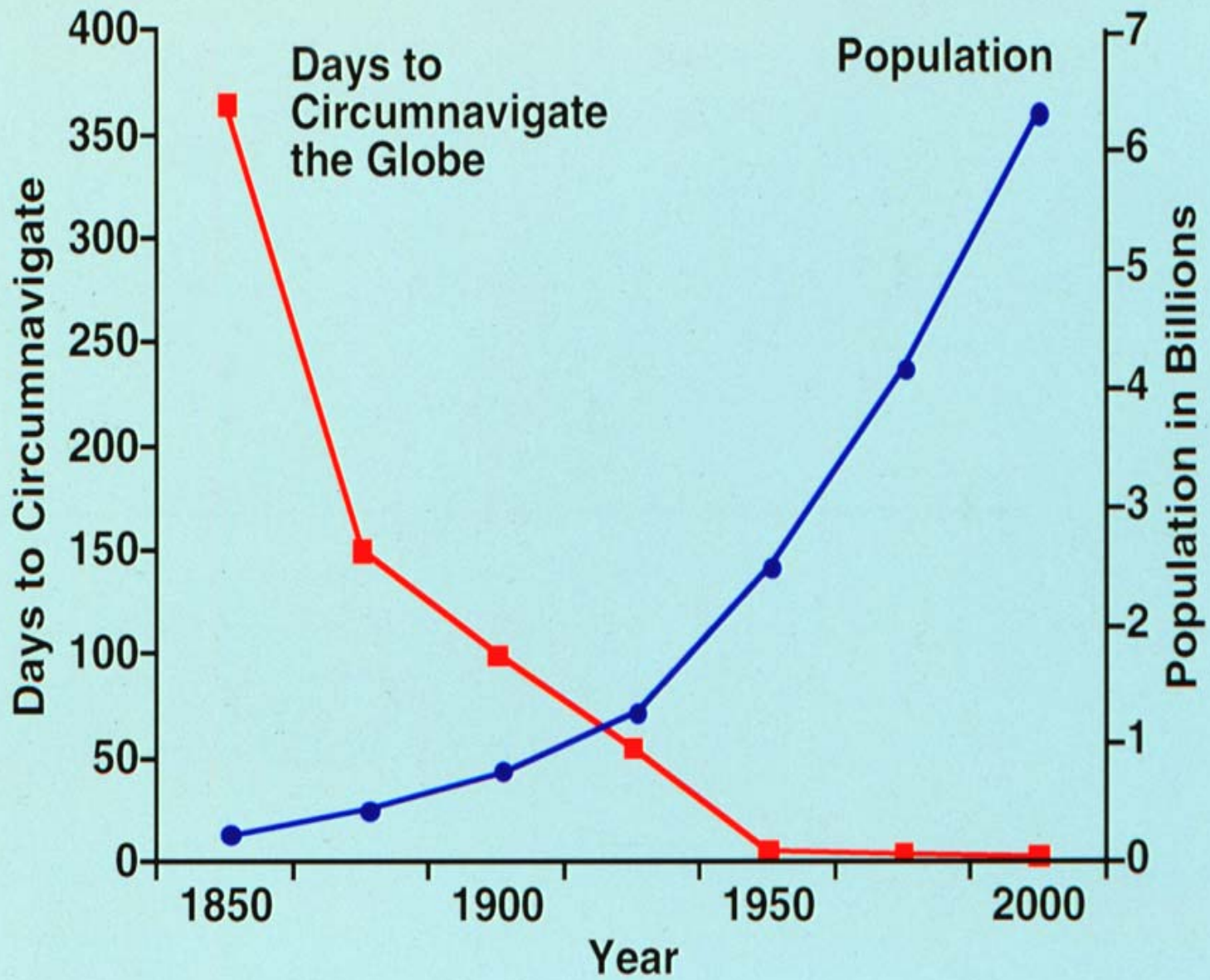


Battle of Waterloo

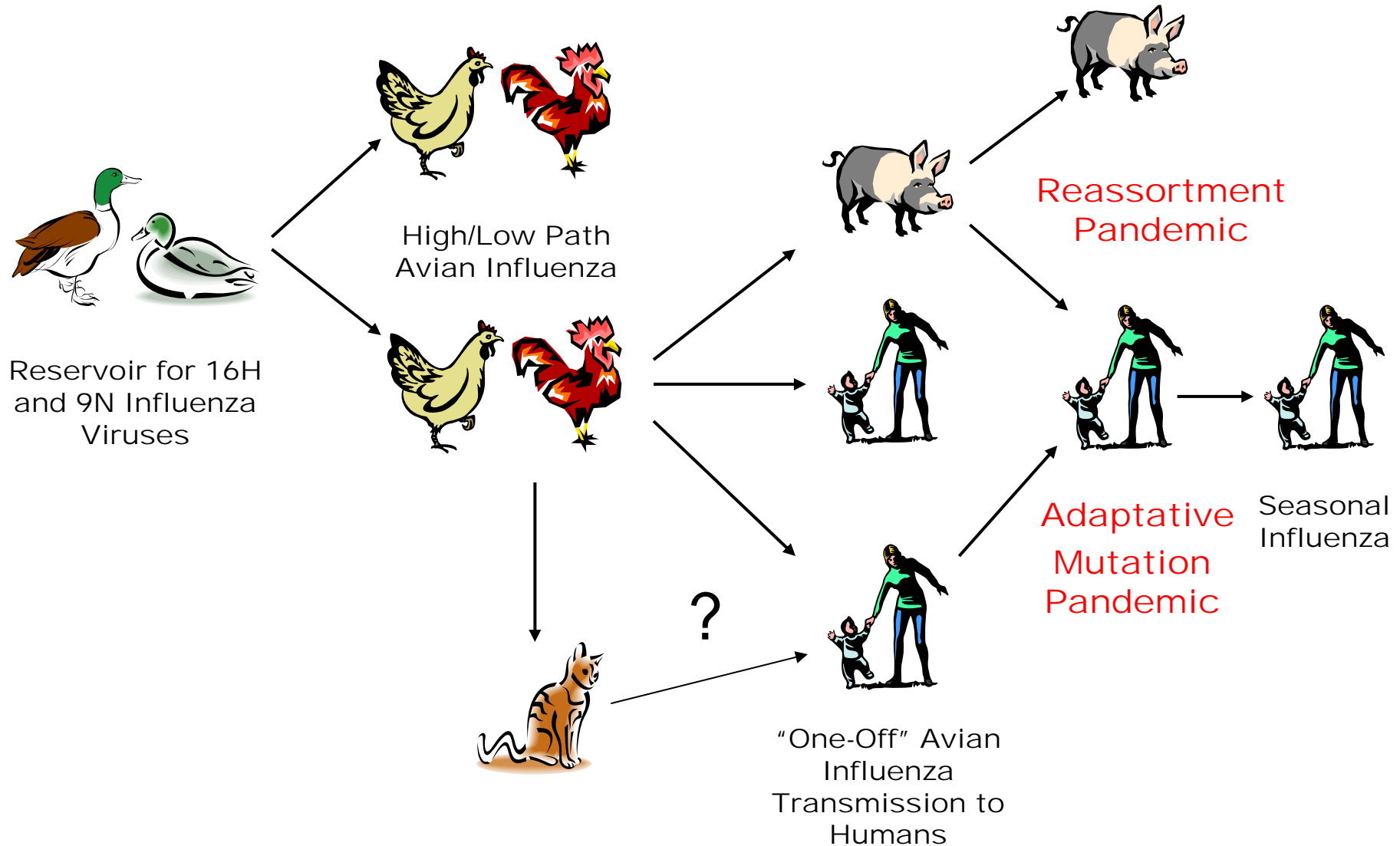
- June 18, 1815
- French Empire vs. United Kingdom & Prussia
- Napoleon had a much larger force of experienced soldiers
 - Attacked at leisure, waited on the weather
 - Assumed superior numbers and skill would prevail
 - Poor understanding of opponents, especially Prussian troops based on past experience
- French army was routed and Napoleon was placed in exile, where he died

Objectives

- The natural history of human influenza pandemics
- Our preparedness for the next pandemic and the global just-in-time economy
- Where do go from here!



The “Seasons” of the Influenza Virus



Severe Influenza Pandemics in History

- Pandemics recorded since Hippocrates
- The 1580 pandemic is classic example
 - Started in Asia and spread to Africa, Europe and the Americas
 - In six weeks afflicted all of Europe
 - Mortality was high, 9,000 of 81,000 residents of Rome died and some Spanish cities were described as “nearly entirely depopulated by the disease”

Pandemics in the Past 300 Years

- Range; 10 to 49 years between pandemics. Average; 24 years

1732-33

1781-82

1800-02

1830-33

1847-48

1857-58

1889-90

1918-19

1957-58

1968-69

Ten Things You Must Know About Pandemic Influenza

WHO; October 14, 2005

- Pandemic influenza is different from avian influenza
- Influenza pandemics are recurring events
- The world may be on the brink of another pandemic
- All countries will be affected
- Widespread illness will occur

Ten Things You Must Know About Pandemic Influenza (continued)

WHO; October 14, 2005

- Medical supplies will be inadequate
- Large numbers of deaths will occur
- Economic and social disruption will be great
- Every country must be prepared
- WHO will alert the world when the pandemic threat increases

Additional Things You Must Know About Pandemic Influenza

- Vaccine and antiviral drugs will have limited impact on the pandemic if it occurs in the next several years
- Waves
- Nonpharmaceutical interventions (NPI) such as quarantine, infection control, social distancing, etc. will likely have limited impact on the number of cases

Additional Things You Must Know About Pandemic Influenza (continued)

- The global just-in-time economy presents a unique state of vulnerability to a pandemic
- International governments will have limited resources to respond “everywhere and to everything” for 12 to 18 months
- Business continuity planning is a critical preparedness requirement
- Hope and despair are not strategies
- We’ll get through it...just like every pandemic in our history

Case and Death Estimates for Next Pandemic

- Most estimate that 30% to 60% of the world's population will become infected
- 1968-like pandemic: 2 to 7.5 million deaths
- 1918-like pandemic: 180 to 360 million deaths
- Current H5N1 case fatality rate; 1.6 billion deaths
- No one really has a clue what the next pandemic will look like or the number of “collateral damage deaths” that will also occur

Total: 393 WHO laboratory-confirmed cases including 248 deaths

Legend:

- Avian Cases (61 countries)
- Human and Avian Cases (15 countries)

Country Case Counts:

- Russia
- Sweden
- Hungary
- Poland
- Slovakia
- Czech Republic
- Denmark
- Germany
- United Kingdom
- Austria
- Slovenia
- Switzerland
- France
- Italy
- Croatia
- Spain
- Bosnia & Herzegovina
- Serbia & Montenegro
- Bulgaria
- Albania
- Greece
- Turkey
- 12 human cases, 4 deaths
- Burkina Faso
- Ghana
- Togo
- Côte d'Ivoire
- Benin
- Cameroon
- Nigeria
- 1 human case, 1 death
- Egypt
- 51 human cases, 23 deaths
- Sudan
- Jordan
- Djibouti
- 1 human case, 0 deaths
- Iraq
- 3 human cases, 2 deaths
- Azerbaijan
- 8 human cases, 5 deaths
- Saudi Arabia
- Bangladesh
- 1 human case, 0 deaths
- Iran
- Kuwait
- India
- China
- 31 human cases, 21 deaths
- Mongolia
- Kazakhstan
- Afghanistan
- Pakistan
- 3 human cases, 1 death
- South Korea
- Japan
- Hong Kong
- Thailand
- 25 human cases, 17 deaths
- Laos
- 2 human cases, 2 deaths
- Vietnam
- 107 human cases, 52 deaths
- Cambodia
- 8 human cases, 7 deaths
- Myanmar
- 1 human case, 0 deaths
- Malaysia
- Indonesia
- 139 human cases, 113 deaths

Source: WHO and OIE (World Organization for Animal Health), 1/7/2009

The Potential for H5N1 to Result In Pandemic Influenza

- H5N1 has many similarities to the 1918 pandemic virus H1N1
- Has an ongoing genetic roulette table for which to achieve a human-to-human transmission capability
- H3N8 example

When Will it Happen?

- No one can predict if, when, or where H5N1 virus will shift from an avian strain with incidental human infections to a genetically competent human-to-human transmitted agent
- Asia remains the genetic roulette table for H5N1 mutations
- First evidence of a pandemic will be sustained third-generation cases
- I wouldn't want to bet my families' life on H5N1 not becoming the next pandemic influenza strain

Preparing for the Next Pandemic

Michael T. Osterholm

FEAR ITSELF

DATING BACK to antiquity, influenza pandemics have posed the greatest threat of a worldwide calamity caused by infectious disease. Over the past 300 years, ten influenza pandemics have occurred among humans. The most recent came in 1957–58 and 1968–69, and although several tens of thousands of Americans died in each one, these were considered mild compared to others. The 1918–19 pandemic was not. According to recent analysis, it killed 50 to 100 million people globally. Today, with a world population of 6.5 billion, more than three times that of 1918, even a “mild” pandemic could kill many millions of people.

A number of recent events and factors have significantly heightened concern that a specific near-term pandemic may be imminent. It could be caused by H5N1, the avian influenza strain currently circulating in Asia. At this juncture scientists cannot be certain. Nor can they know exactly when a pandemic will hit, or whether it will rival the experience of 1918–19 or be more muted like 1957–58 and 1968–69. The reality of a coming pandemic, however, cannot be avoided. Only its impact can be lessened. Some important preparatory efforts are under way, but much more needs to be done by institutions at many levels of society.

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Unprepared for a Pandemic

Michael T. Osterholm

SOUNDING THE ALARM, AGAIN

MORE THAN a year and a half ago, *Foreign Affairs* published three articles that sounded a clarion call to prepare for the next pandemic. They warned that another pandemic could occur at any time and at a staggering cost to human health and the world economy. These facts remain incontrovertible. At the time, many public health scientists believed that recent outbreaks of the H5N1 influenza virus in birds in Asia, Europe, and Africa, with occasional infections in humans, were precursors to the next pandemic. They still do today.

Like earthquakes, hurricanes, and tsunamis, influenza pandemics are recurring natural disasters. The natural reservoir of influenza virus is wild aquatic birds. But for a human influenza pandemic to occur, a strain of an avian influenza virus must develop to which humans have no preexisting immunity and undergo critical genetic changes that allow it to be readily transmitted from person to person. The H5N1 strain of the influenza virus has had a limited impact on human health so far, but a human influenza pandemic could occur—and be devastating—if a current strain underwent the right genetic changes.

For decades, scientists believed that the only way for an avian influenza virus to become transmittable between humans was through a process known as reassortment. Reassortment occurs when an avian virus and a human virus both infect the same cells of an animal (a pig, for example)

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Critical Products and Services

- Products and services on which we depend for our immediate health and safety
 - Water
 - Food
 - Basic prescription drugs
 - Safety
 - Protection against the elements (heat or cold)
- These products and services are often taken for granted and it is assumed they will “always be available”

The Pandemic Declaration (It's Here But It's Not)

- Where it starts and how fast it moves will determine the course of this stage
- What haven't we planned for?
 - Food and other basic “survival consumer goods”
 - Global supply chains may be severely challenged
 - School and work attendance

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Protecting public health and global
freight transportation systems
during an influenza pandemic

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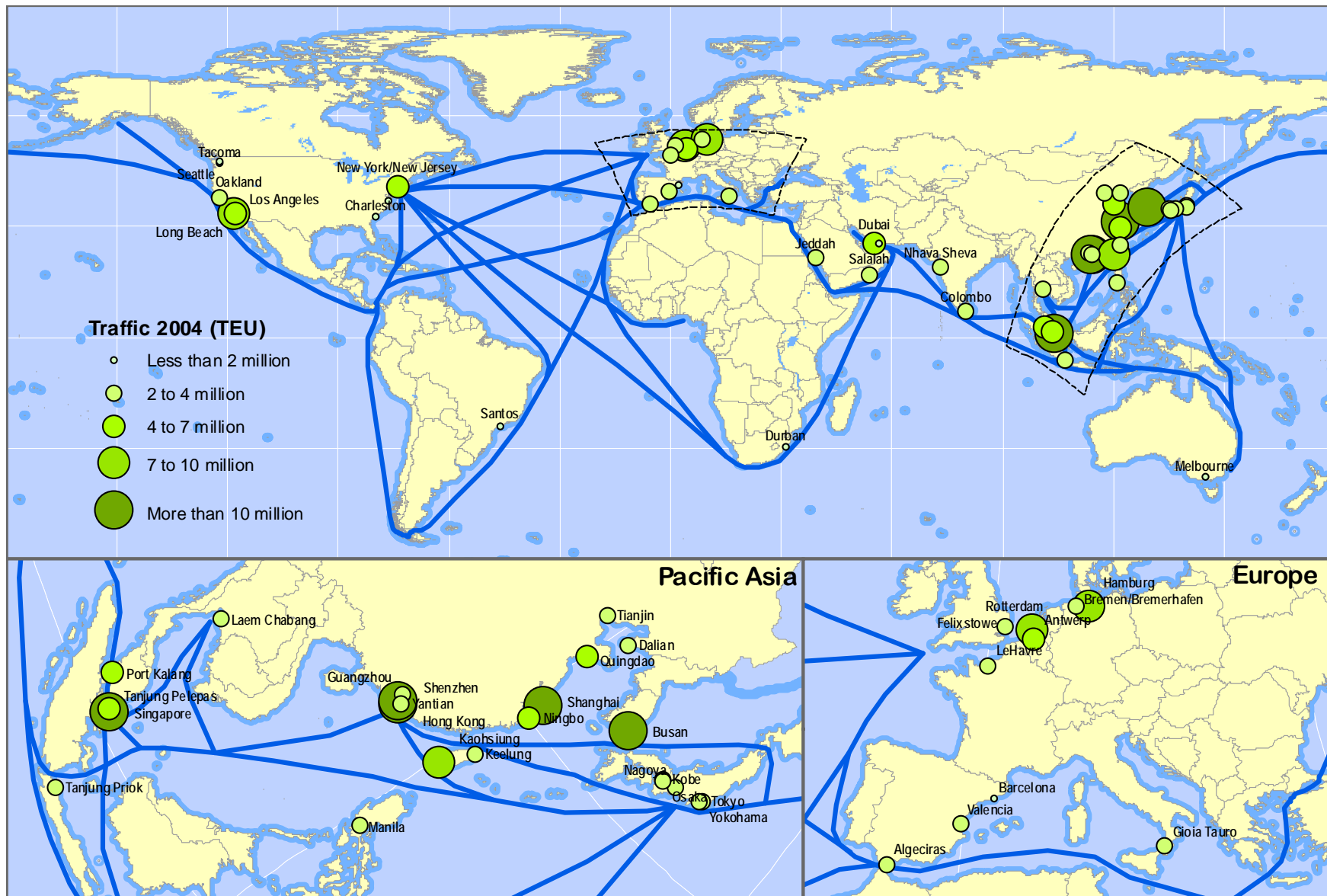
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50 Largest Container Ports and Major Sea Lanes, 2004





The Integrated Freight Transportation Network

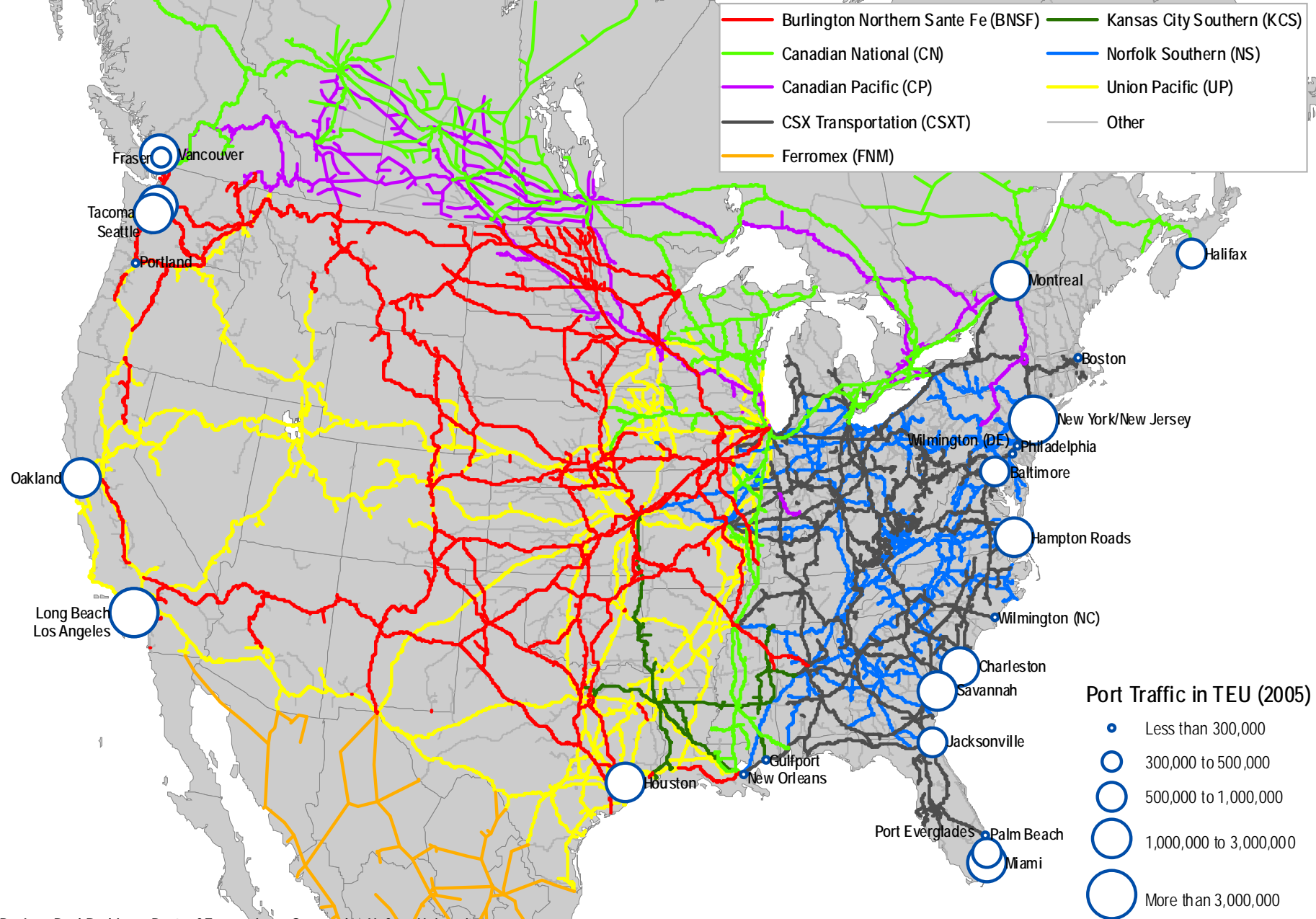


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'Familia; South America' Disc
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Container Port Traffic and Ownership of Major Rail Lines, 2005



The Pandemic Declaration (It's Here But It's Not)

- Where it starts and how fast we see it move will determine the course of this stage
- What haven't we planned for?
 - Food and other basic “survival consumer goods”
 - Global supply chains may be severely challenged
 - School and work attendance

Pandemic Direct Hit

- The severity of the pandemic wave will determine only a part of the pandemic's impact on society
- What haven't we planned for?
 - Life-saving drugs
 - Respiratory protection
 - Exam gloves
 - Ventilator support
 - Global supply chains
 - Electricity

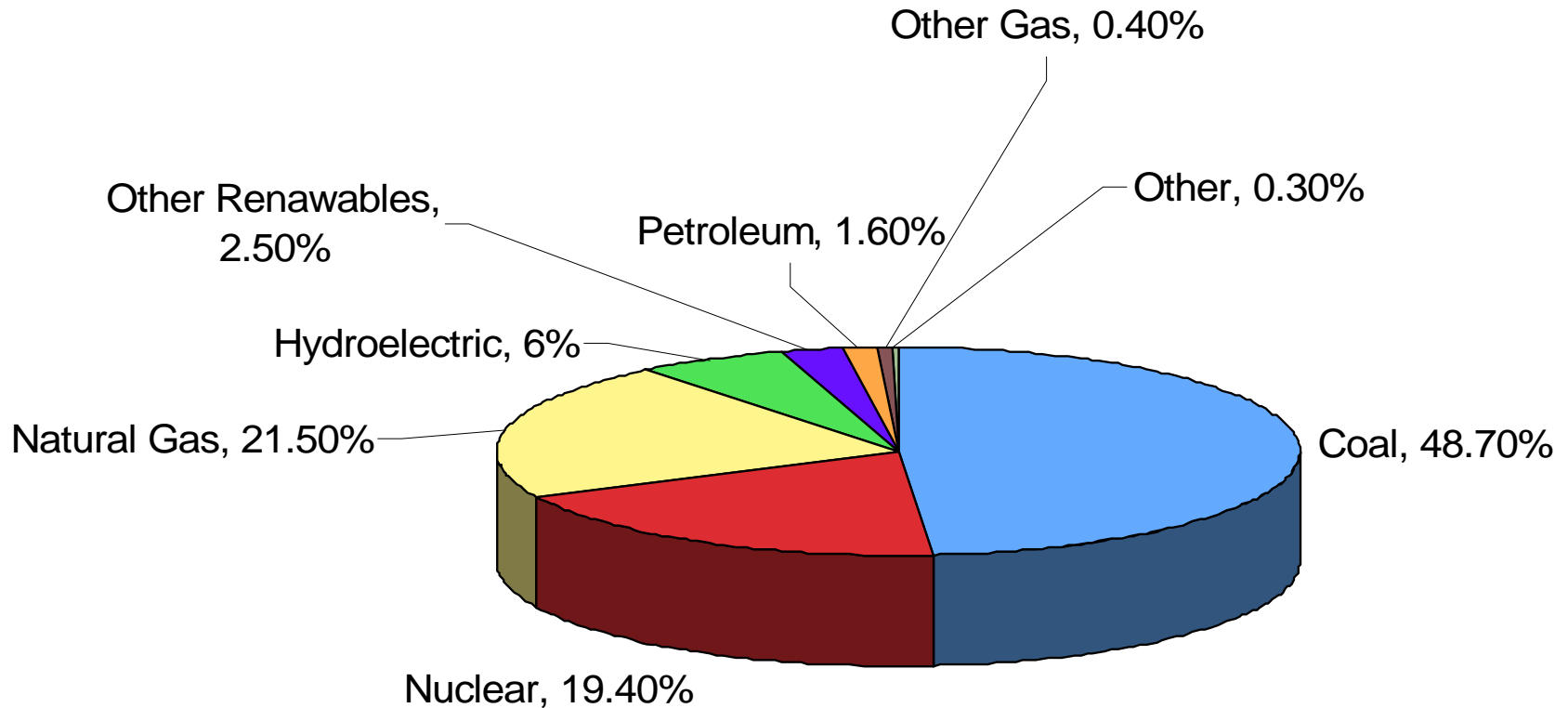
The Seasons of the Next Influenza Pandemic

- The pandemic declaration (it's here but it's not)
- Pandemic direct hit
- Pandemic interlude
- The final pandemic curtain

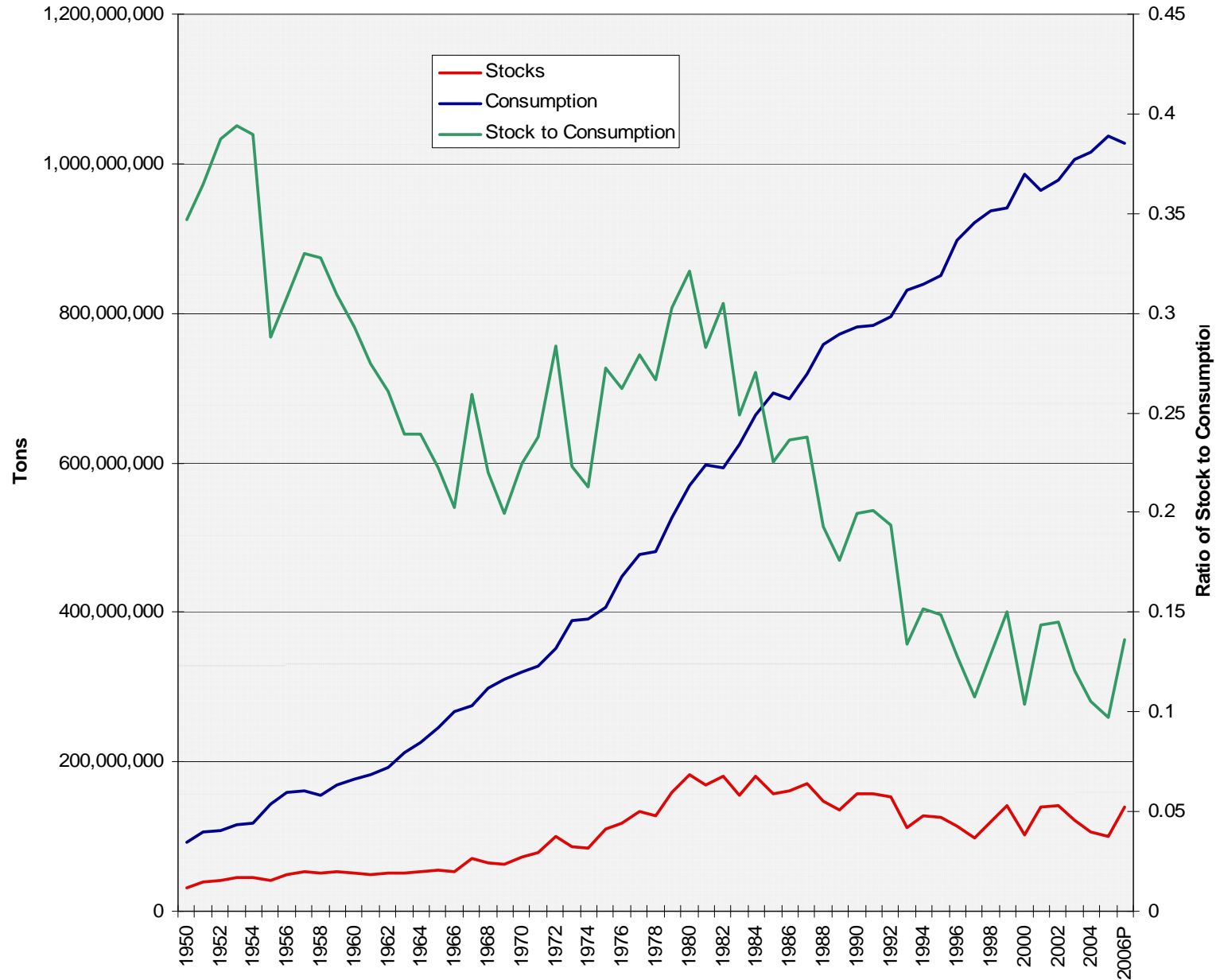
Pandemic Interlude or The Final Pandemic Curtain

- How will we know when it is over?
- Energy, energy, and energy
- Electricity is the underpinning of public health
 - Water
 - Sewage
 - Refrigeration
 - Petroleum
 - Communication

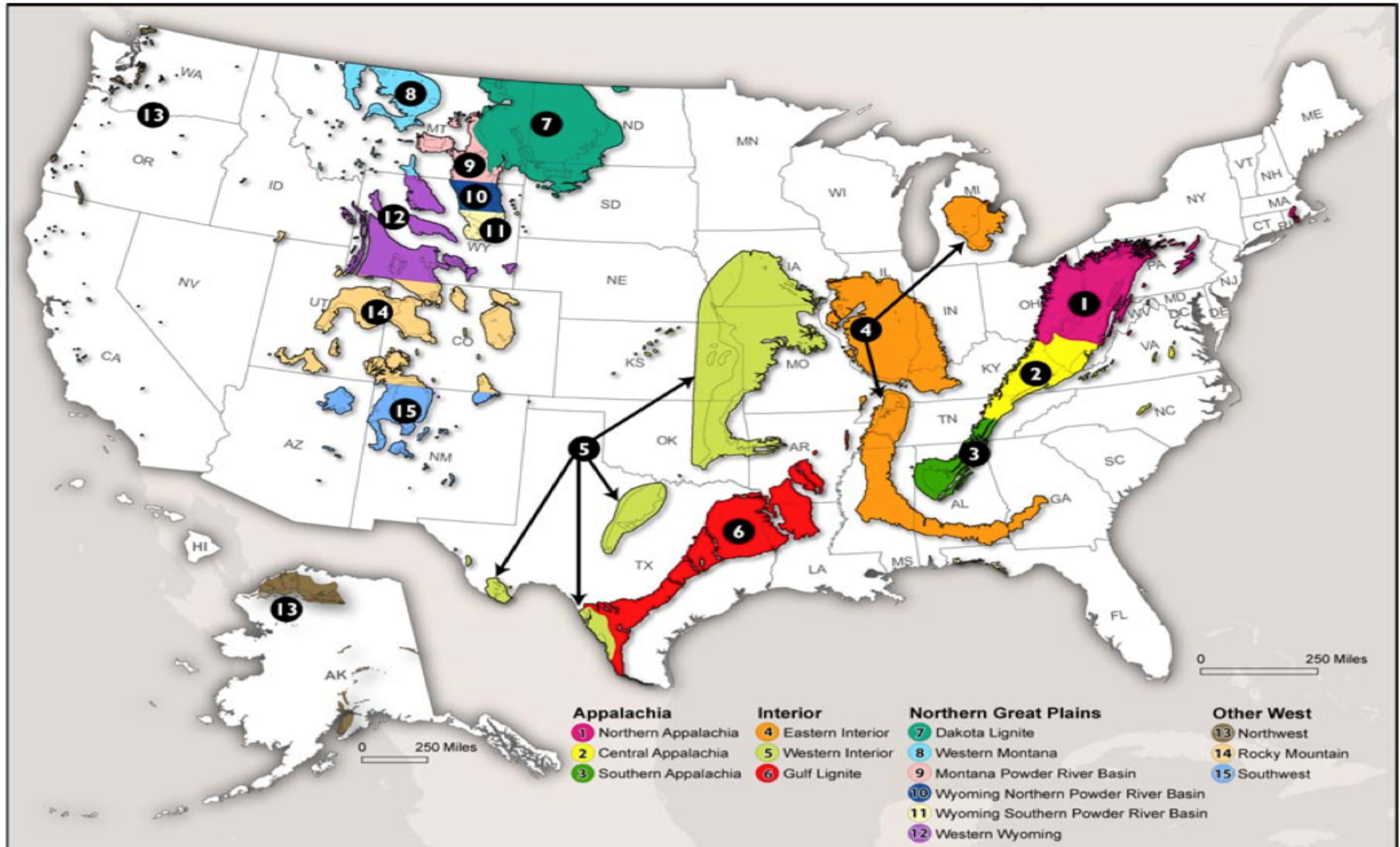
Net Power Generation in the US by Fuel Source, 2007



Coal Stock and Consumption Since 1950



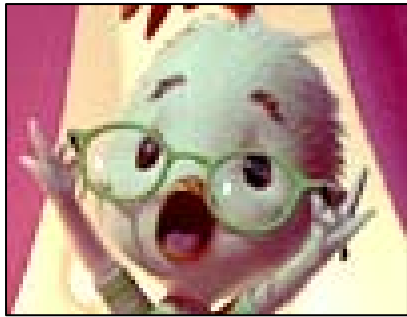
Coal fields in the US



Source: Coal Fields of the Conterminous United States, Originator: USGS; Eastern Energy Team; John Tully compiler. Publication Date: May 3, 1996, <http://pubs.usgs.gov/of/1996/of96-092/>
 Region boundaries and names are adapted from those used by the Energy Information Administration's National Energy Modeling System. Map: Congressional Cartography, Library of Congress, 2007

Avian Influenza Overview

A Modern World View of Pandemic Influenza



Chicken
Little



"We're All
Going to
Die"

The Truth



“It’s no use saying, ‘We’re doing our best.’ You have got to succeed in doing what is necessary.”

Sir Winston Churchill

WILLIAMS

