INDUSTRY CHALLENGE AND *PERSPECTIVE* AND WIND BUSINESS AND OPERATING ASPECTS

Northwest Wind Energy & Wildlife Workshop

Portland, Oregon

June 7-8, 2011

Wind Development v. Home Purchase

- Underlying research: Wind Resource, Transmission Access, Potential Markets, permitting requirements. Environmental analysis, Mitigation hierarchy [how are the schools, what are the CCRs]
- Mortgage Application: Analyze results, apply for permits, Present to power company [home value appraisal, income stream to support payment schedule]
- Credit Check: Short list for PPA, financing evaluation by lender [debts, assets, income]
- Closing: All permits secure, LGIA & PPA signed, check from bank [deliver check, get keys]
- Happily Ever After: no unforeseen changes: income stream (wind blows, equipment holds up, no unforeseen curtailment, interconnection remains strong, load demands electrons, power company pays, pay lenders) [Keep job, make payments]

WHY WIND?

CLIMATE
CHANGE

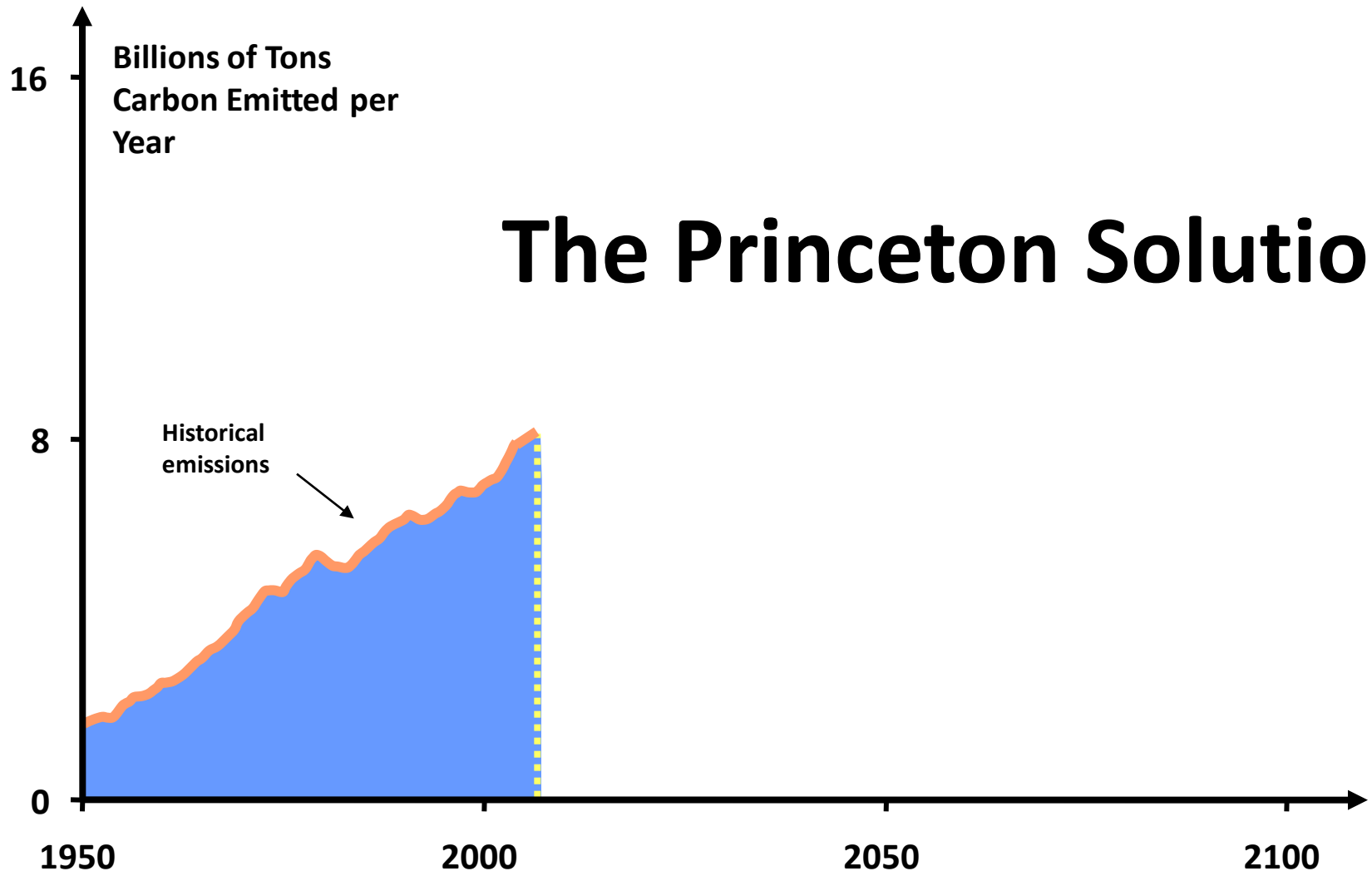
Declining Northern Polar Ice Cap

1979

2005

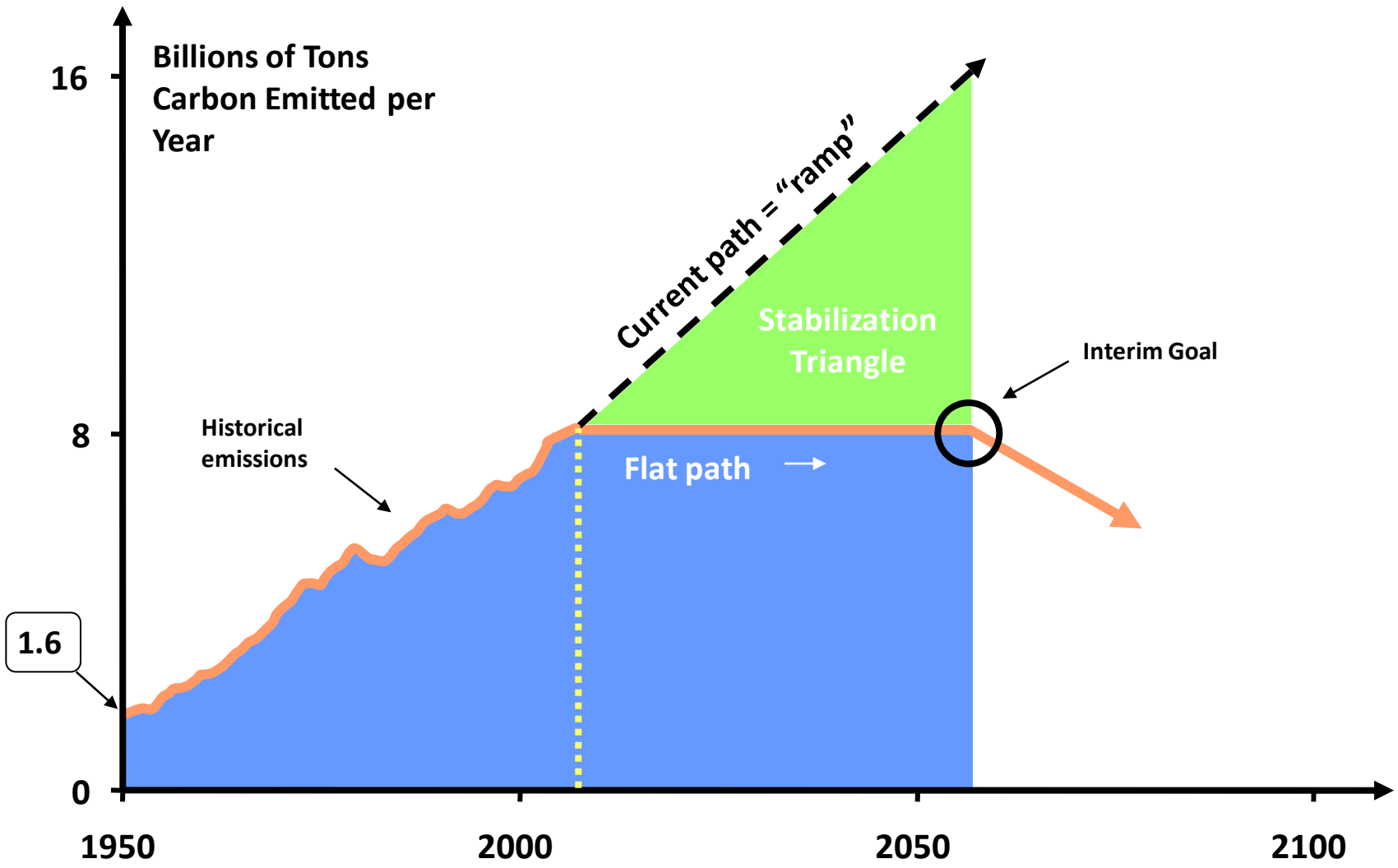
Source: Everybody's Weather, 2005.
http://www.everybodysweather.com/Static_Media/Polar_Ice_Cap_Melter/index.htm

Historical Emissions

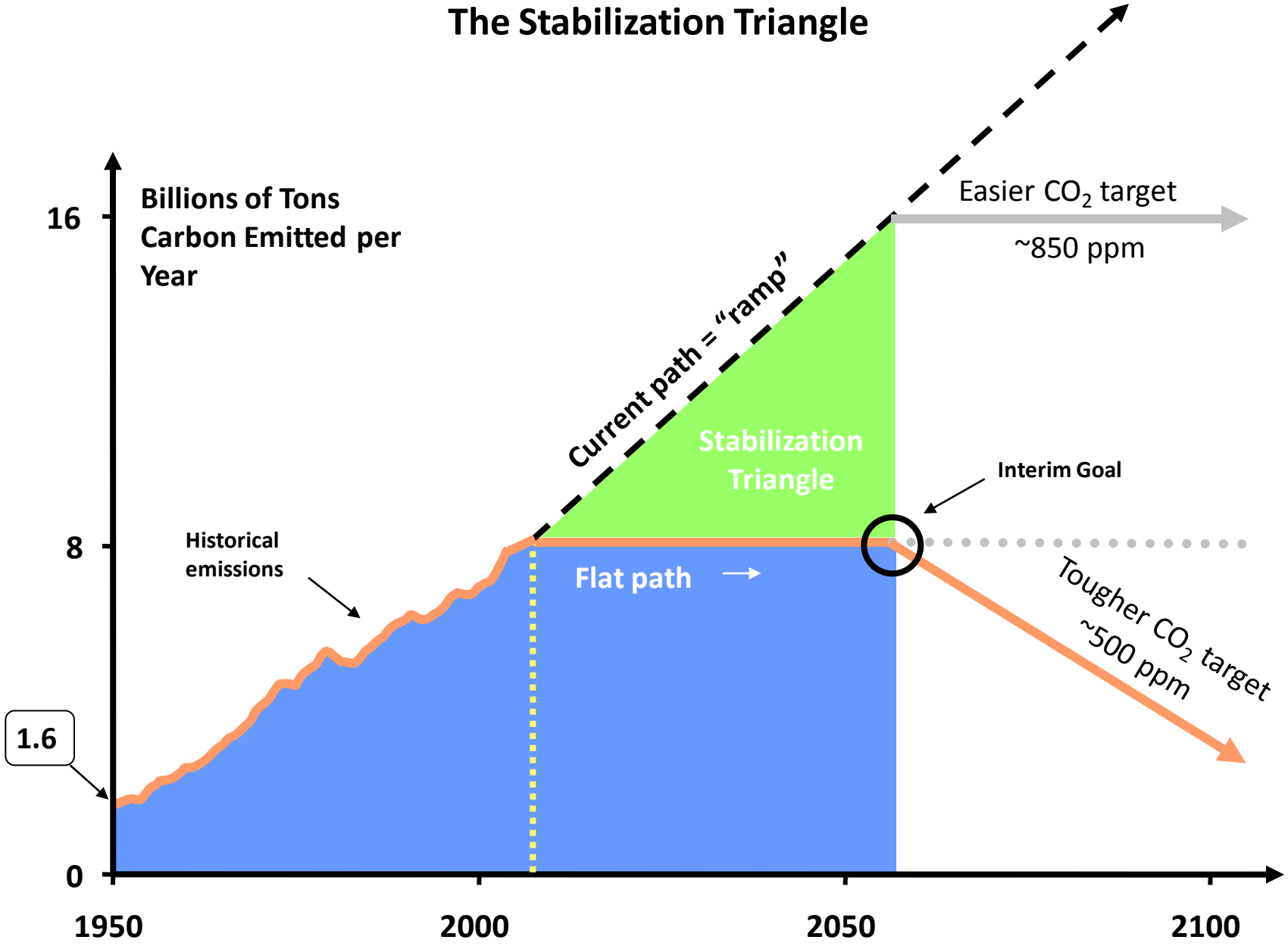


The Princeton Solution

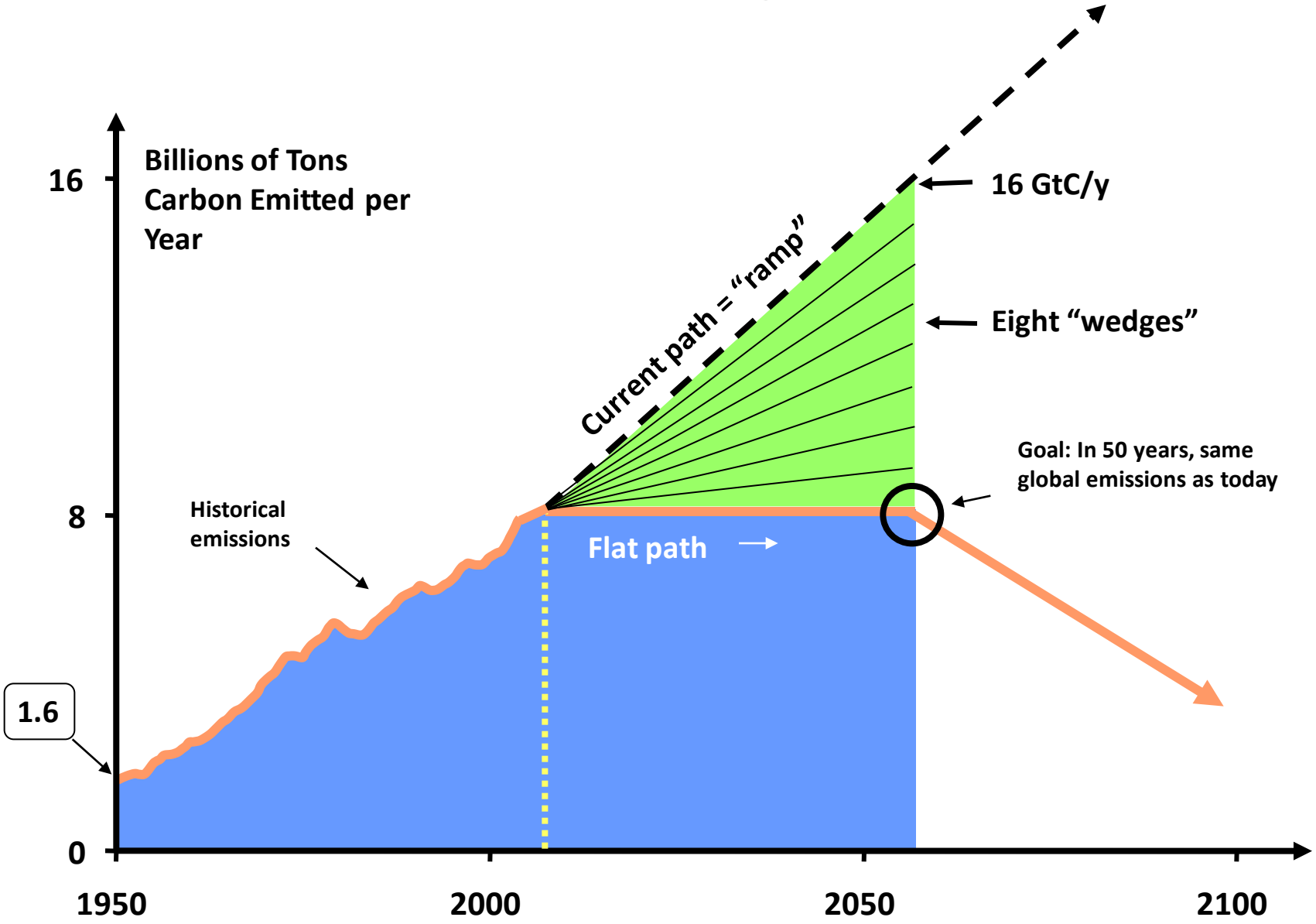
The Stabilization Triangle



The Stabilization Triangle

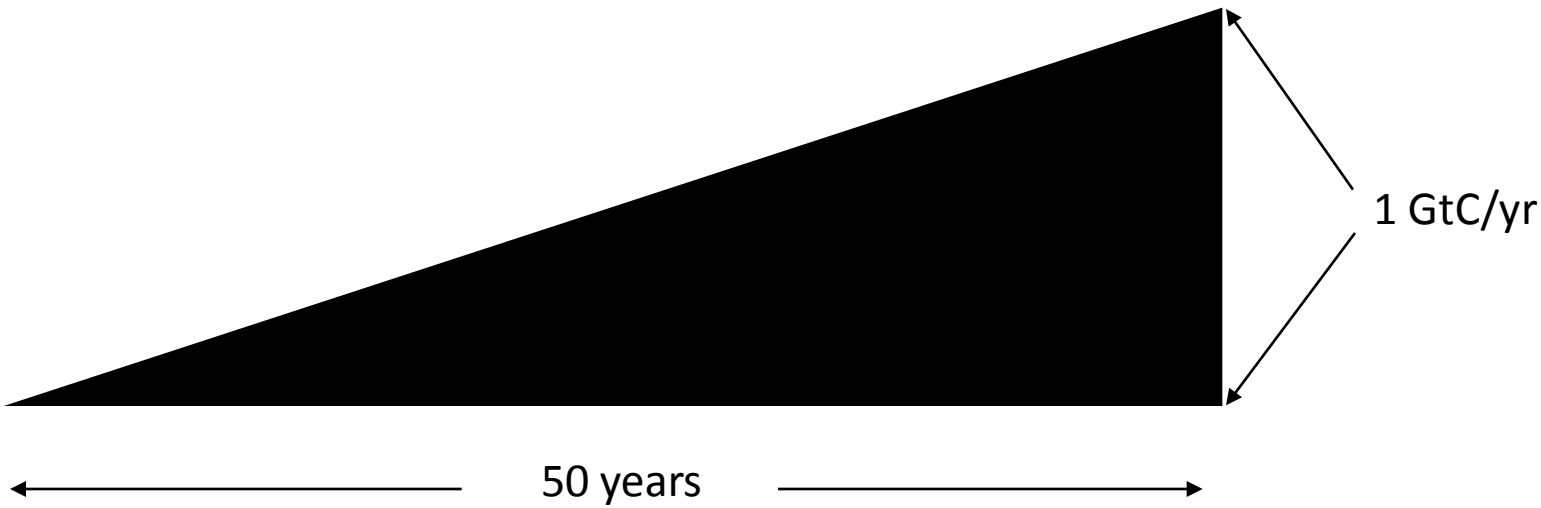


Stabilization Wedges



What is a "Wedge"?

A "wedge" is a strategy to reduce carbon emissions that grows in 50 years from zero to 1.0 GtC/yr. The strategy has already been commercialized at scale somewhere.



Cumulatively, a wedge redirects the flow of 25 GtC in its first 50 years.
This is 2.5 trillion dollars at $100/tC.

A "solution" to the CO_2 problem should provide at least one wedge.

http://cmi.princeton.edu/wedges/slides.php

Princeton's Dr. Robert Socolow creates wedge theory to address carbon problem

8 wedges are required to level off carbon growth (bumped up from 7 four years ago)

4 wedges can be created by wind energy development alone

http://cmi.princeton.edu/wedges/slides.php

Wind Electricity

Photo courtesy of DOE

Install 1 million 2 MW windmills to replace coal-based electricity,

OR

Use 2 million windmills to produce hydrogen fuel

A wedge worth of wind electricity will require increasing current capacity by a factor of 30

http://cmi.princeton.edu/wedges/slides.php

present global wind energy generation: 197 gigawatts (WWEA May 23, 2011):
http://www.wwindea.org/home/index.php
Global generation has nearly doubled from 105.7 GW at end of 2007
http://www.gwec.net/fileadmin/documents/Global%20Wind%202008%20Report.pdf))

WHAT IF WE DO NOTHING?

Warming may threaten **37% of species** by 2050. This translates to 1.25 million species.

-Washington Post January 8, 2004

- Extreme Weather
- Flooding
- Drought
- Ocean acidification
- Extreme changes in local weather
- Decreased agricultural production

UN International Panel on Climate Change (Established by the World Meteorological Org.) 4th assessment Report (2007):

How Wind Helps Reduce Global Warming

- Electricity generation is the largest industrial source of air pollution in the U.S. and demand for electricity continues to grow.
- The United States produces six billion metric tons of carbon dioxide annually. By 2030, this number could reach 6.75 billion metric tons. 40% of CO2 emissions are generated by the electric power sector.
- Wind power generates no emissions, and displaces carbon dioxide and other greenhouse gases that would otherwise be emitted by fossil fuel-fired electric generation.
- The clean generation provided by wind capacity installed through 2008 will displace approximately 44 million tons of carbon dioxide annually.

http://www.awea.org/learnabout/publications/upload/Climate_Change.pdf

Wind by the Numbers:

In May, 2008, the U.S. Department of Energy released a study* of the feasibility of generating 20% of U.S. electricity needs from wind power by 2030. DOE determined that achieving this level of wind generation is feasible without any technological breakthroughs and would have significant environmental benefits:

- The cumulative effect of achieving 20% wind energy by 2030 would be reducing CO2 emissions by 7,600 million metric tons, and through 2050, reducing emissions by an additional 7,400 million metric tons;
- Using wind to generate 20% of U.S. electricity will almost single-handedly keep electric sector emissions from increasing despite dramatically increased demand;
- The 20% scenario would displace 50% of electricity generated from natural gas and 18% of electricity generated by coal, alleviating pressure on gas markets, eliminating the need to build more than 80 gigawatts of new coal capacity and lowering electricity prices; and
- It would also reduce cumulative water consumption in the electric sector by eight percent, or four trillion gallons by 2030, with nearly 30% of the savings occurring in western states where water is particularly scarce.

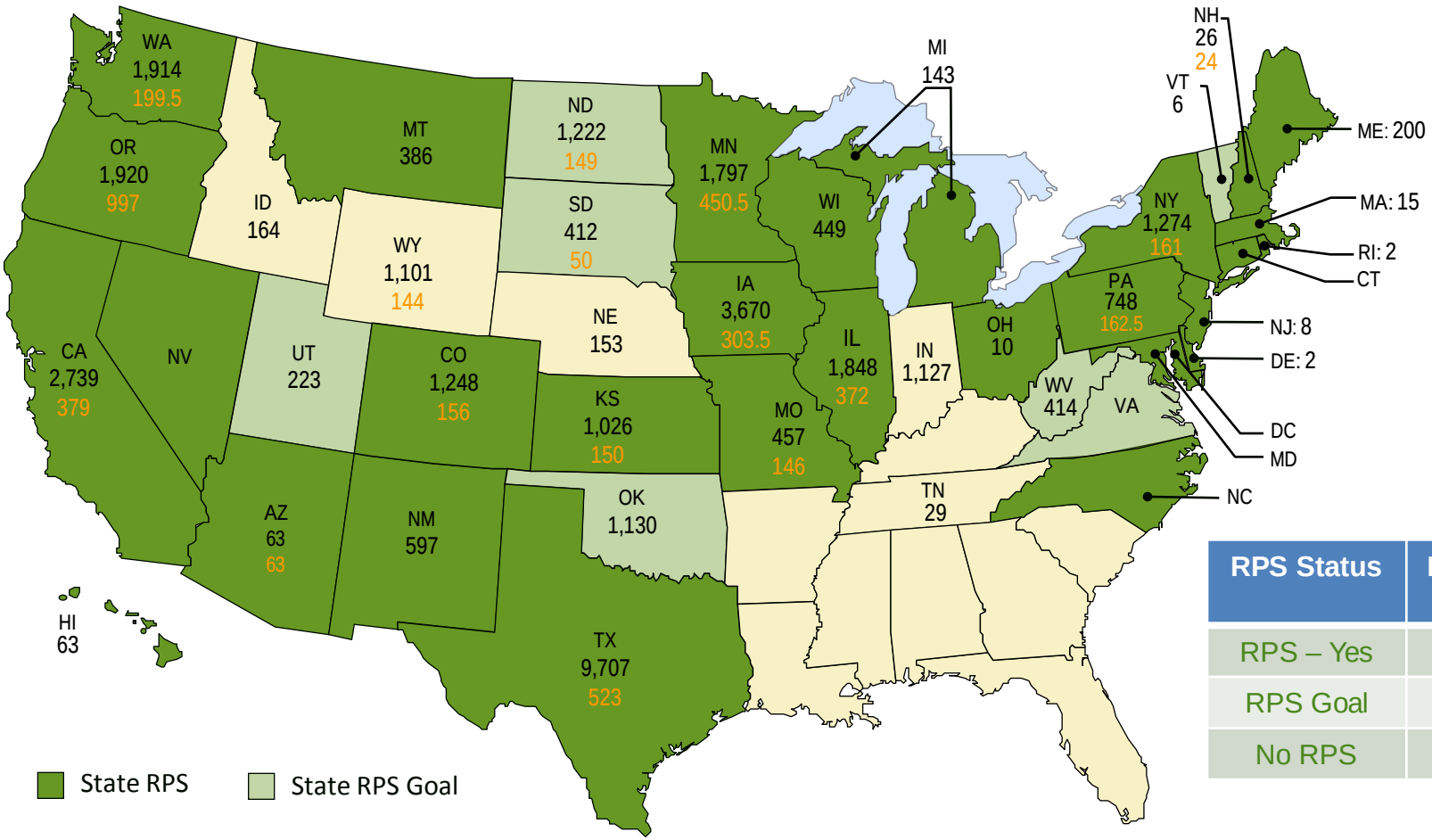
A related study** concluded that the 20% wind scenario would reduce natural gas costs to consumers by approximately $128 billion and would lower the cost of compliance with climate legislation by around $98 billion.

A study by the Midwest Independent System Operator (MISO) showed that 16,000 MW of added wind capacity would avoid 43 million tons of CO2, or approximately 1,300 pounds of CO2 for every megawatthour of wind generation.***

** 20% Wind Energy by 2030, U.S. Department of Energy (2008) http://www.20percentwind.org*
***Power System Modeling of 20% Wind-Generated Electricity by 2030, NREL (2008) http://www.nrel.gov/docs/fy08osti/42794.pdf*
**** Transmission Expansion Plan, Vision Exploratory Study, Midwest ISO (2006) http://www.midwestiso.org/page/Expansion+Planning*

Installed Wind by RPS Status

(Total MWs/state and IRI Installed MWs)



RPS Status	IRI Installed MWs
RPS – Yes	4,088
RPS Goal	199
No RPS	144

Updated September 2010

The Wind Industry Is Enthusiastically Environmentally Conscious. Why? How does that manifest itslf?

- Green Branding: its out biggest sales advantage over traditional forms of generation
- Many are involved in wind for climatological reasons; as a manner of personal expression
- Many embrace environmental challenges and strive for zero net loss
- Many are energized by the thought their work will contribute to baseline species data
- You have gotten to know us and you know the scientists who advise us: they are committed, thorough and professional
- Cooperation, Collaboration, and Commitment
  - We answer your calls and work with you
  - Do the others? Oil? Gas? Coal?

Challenges for Renewable Energy

- Indefinite period of short-term national vision on a sustainable, diversified energy policy
  - Causes a lack of certainty about long-term investments, concentrating efforts on meeting short-term objectives.
- Negative demand for energy, 1st time since Great Depression
  - Little to no market for renewable energy but for residual demand in CA and the northeast
- Domestic supply of natural gas, historic low prices
  - Renewable energy or any alternative energy source cannot realistically compete
- Reduced investments in furthering science of wind/wildlife interactions
  - A lack of these investments will make policy development more difficult and less effective, restricted access to funds for R&D
- **Regulations/Environmental/ Knowledge/Understanding**

What Regulations are in wind's path?

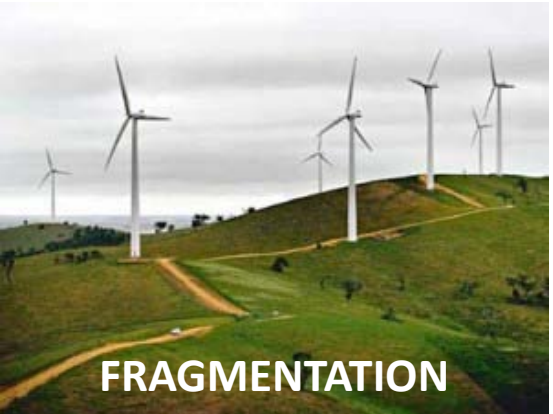
- **Bald & Golden Eagle Protection Act**
  - NEPA nexus to (virtually) all US wind energy development
  - 5 Year Permit Life – Unfinanceable 20 year power contract
    - Back to mortgage metaphor: you will lose job in 5 years, but you may reapply
  - No individual take permits
  - No Programmatic Take Permits East of the 100th Meridian
  - "Zero Take Threshold" (no permits available anyway?)
    - Where: Project footprint? Local area? State? BCR? Region? US? Continent?
  - ARRA $ Left in Treasury in 2010, likely again in 2011
- **Wind Energy Guidelines**
  - Non-iterative
  - Prescriptive
    - 3 Years Pre- & 5 Years Post-Construction
  - NEPA based (through BGEPA inclusion)
  - Non-Science based (Noise, mandatory setbacks, avoidance, etc.)
  - Adaptive mgmt as routine, not exceptional circumstances (Radar, curtailments, etc.)
    - Would we require a utility to de-energize or remove electric lines?
    - (Unwilling to incur the expense of safety retrofits).
- **Are MBTA based guidelines the next challenge for wind?**
  - 1007 individual birds

The jury is still out: both documents went out for public comment and await final USFWS review.

WIND ENERGY GENERATION HAS IMPACTS

KNOWN DIRECT IMPACTS

KNOWN INDIRECT IMPACTS



UNKNOWNS

Causes & Numbers of Bird Deaths

- 100-900 Million: Glass Windows (Dr. Daniel Klem, Muhlenberg College)
- Up to 174 Million: Electric Transmission Line Collisions (USFWS)
- 100 + Million: Hunting (USFWS)
- 100 Million: House Cats (National Audubon Society)
- 50-100 Million: Cars & Trucks (Nat'l Ins. For Urban Wildlife; USFWS)
- 67 Million: Agriculture: Pesticide Poisoning (Smithsonian)
- 4-10 Million: Communication Towers (USFWS)
- 1-2 Million: Oil/Gas Extraction (USFWS) (not counting spills or transportation issues)
- 100,000: wind Turbines *
- 14,000 +: aircraft Collisions**
- 1,000 + raptors: Electrocution
- Unknown: intentional poisonings & shootings, Logging, Strip Mining, Climate Change

Curry & Kerlinger, http://www.currykerlinger.com/birds.htm ;
*Wind Turbine Number "Environmental Impacts of Wind-Energy Projects," National Academy of Sciences, 2007
**Bird Strike Committee USA, http://www.birdstrike.org/

American Bird Conservancy Bird Mortality Estimates

Collisions with:	Year of Estimate	Mortality Estimate Low	Mortality Estimate High
Wind Turbines	2009/10	100,000 (2010)	440,000 (2009)
Towers	2008	4,000,000	50,000,000
Power Lines	2001	10,000,000	154,000,000
Roads/Vehicles	2005	10,700,000	380,000,000
Urban Light	2009	31,158,000	
Glass	2006	100,000,000	1,000,000,000

http://www.abcbirds.org/abcprograms/policy/collisions/index.html

USFWS Analysis

- Total North American Fall Count: 20 Billion Birds.
- Acquiring reliable estimates of anthropogenic caused bird deaths is difficult.
- "Recent extrapolations from various databases indicate that human-caused mortality could account for billions of bird deaths per year (Klem 1990, Corcoran 1999, Erickson and others 2001, Manville 2001a, Manville 2001b)."
- "Based only on estimates of annual mortality from
    - vehicles strikes (60- 80 million);
    - building and window collisions (98- 980 million);
    - smoke stack casualties (tens to hundreds of thousands);
    - power line electrocutions (tens to hundreds of thousands);
    - power line impacts (hundreds of thousands to perhaps 175 million);
    - communication tower accidents (4-5 to 40-50 million); and
    - wind turbine impacts (~ 34,000 to perhaps hundreds of thousands),

  Erickson and others (2001) estimated from 100 million to well over one billion birds killed annually."

BIRD STRIKES AND ELECTROCUTIONS AT POWER LINES, COMMUNICATION TOWERS, AND WIND TURBINES: STATE OF THE ART AND STATE OF THE SCIENCE - NEXT STEPS TOWARD MITIGATION, Albert M. Manville, II, Ph.D. 2, 2005
http://www.fws.gov/midwest/wind/references/ManvilleBirdMortality.pdf

WEST, Inc. 2005 Bird Fatality Study

- 10,975 Turbines generating 2,318 MW at 11 Wind farms
- ~ 2 birds per turbine per year
- ~ 3 birds per MW per year
- ~ .05 Raptors per Turbine per year
- ~ .02 Raptors per MW per Year
- Includes the Altamont with ~5,400 Turbines Generating ~ 548 MW

http://www.fs.fed.us/psw/publications/documents/psw_gtr191/Asilomar/pdfs/1029-1042.pdf

WHOOPING CRANES

Whooping Cranes: ENDANGERED

- "The main threat to whooping cranes in the wild is the potential of a hurricane or contaminant spill destroying their wintering habitat on the Texas coast. Collisions with power lines and fences are known hazards to wild whooping cranes. The primary threats to captive birds are disease and parasites. Bobcat predation has been the main cause of mortality in the Florida experimental population."
- Lowpoint: 18 Birds at Aransas WFR in late 1930s. http://www.tpwd.state.tx.us/huntwild/wild/species/whooper/
- Population levels

Source: USFWS at http://www.fws.gov/northflorida/WhoopingCrane/whoopingcrane-fact-2001.htm

Past injury, Future Threat

Growth of human populations in North America resulted in significant whooping crane habitat alteration and destruction. Historically, whooping cranes declined or disappeared as agriculture claimed the northern Great Plains of the United States and Canada (Allen 1952). Hundreds of whooping cranes were shot and, as the species became increasingly rare, eggs were collected and sold to collectors (Allen 1952). Declines also resulted from displacement by human activities and agricultural practices. The extensive drainage of wetlands in the prairie pothole region of Canada and the United States resulted in a tremendous loss of migration habitat available to whooping cranes (CWS and USFWS 2007). Original migration stopover habitat became unsuitable due to draining, fencing, sowing, and subsequent conversion of pothole and prairie wetlands to hay and grain production.

The International Whooping Crane Recovery Plan (CWS and USFWS 2007) lists the following as current threats and reasons for listing: human settlement/development, insufficient freshwater inflows, shooting, disturbance, disease, parasites, predation, food availability, sibling aggression, severe weather, loss of genetic diversity, climate change, red tide, chemical spills, collisions with power lines, fences, and other structures, collisions with aircraft and pesticides. Major current threats include limited genetics of the population with an estimated 66% of the genetic material lost during the decimation of the population, loss and degradation of migration stopover habitat, construction of additional power lines and communication towers, fences, degradation of coastal habitat, and threat of chemical spills in Texas. A spill from commercial vessels carrying dangerous, toxic chemicals that travel the Gulf Intracoastal Waterway daily through the heart of whooping crane winter habitat could contaminate or kill the cranes' food supply, or poison the cranes (Robertson et al. 1993). Another threat to the whooping crane is the decrease in the suitability of the species' winter habitat due to accelerating development within and adjacent to the designated critical habitat in Texas.

ftp://wiley.kars.ku.edu/windresource/Whooping_Crane_and_Wind_Development_FWS_%20April%202009.pdf

Whooping Cranes & Wind Energy Fear

- **6-1-07 Whooping Cranes and Wind Farms - Guidance for Assessment of Impacts** By Tom Stehn, USFWS Whooping Crane Coordinator. If take occurs, wind farm could be shut down, same if cranes pass up stopover points to avoid wind farms. http://www.neo.ne.gov/renew/wind-working-group/wind-whoopingcranes.pdf
- WHOOPING CRANES AND WIND DEVELOPMENT - AN ISSUE PAPER By Regions 2 and 6, U. S. Fish and wildlife Service, April 2009 ftp://wiley.kars.ku.edu/windresource/Whooping_Crane_and_Wind_Development_FWS_%20April%202009.pdf

Wind Whooping Crane Programmatic HCP

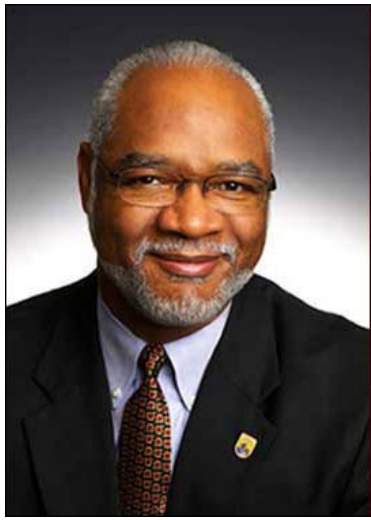
- In 2007, two of the industry's most ardent environmentalists, Rene Braud and Stu Webster met with Tom Stehn wind and whooping cranes. Tom is a leader in whooping crane protection and the USFWS Whooping Crane Coordinator . He works at the Aransas National Wildlife Refuge. Tom was in the process of writing *WHOOPING CRANE RECOVERY ACTIVITIES* http://www.bringbackthecranes.org/recovery/pdf/recv08.pdf . In this paper, Tom outlined the threat to whooping cranes from water supply mismanagement that negatively impacts freshwater inflows to critical habitat.

- In 2008, in response to a call from Tom, Dr. Benjamin Tuttle, Regional Director for the U.S. Fish and Wildlife Service's Southwest Region, contacted Rene and Stu to follow up on their inquiry and the industry's HCP effort was underway.

- No Programmatic Whooping Crane HCPs for any industry other than wind.

- An exploratory committee was formed by some utilities regarding a possible programmatic HCP for NEW powerline construction. Has not progressed beyond exploratory phase.

Rene Braud



Dr. Benjamin Tuttle

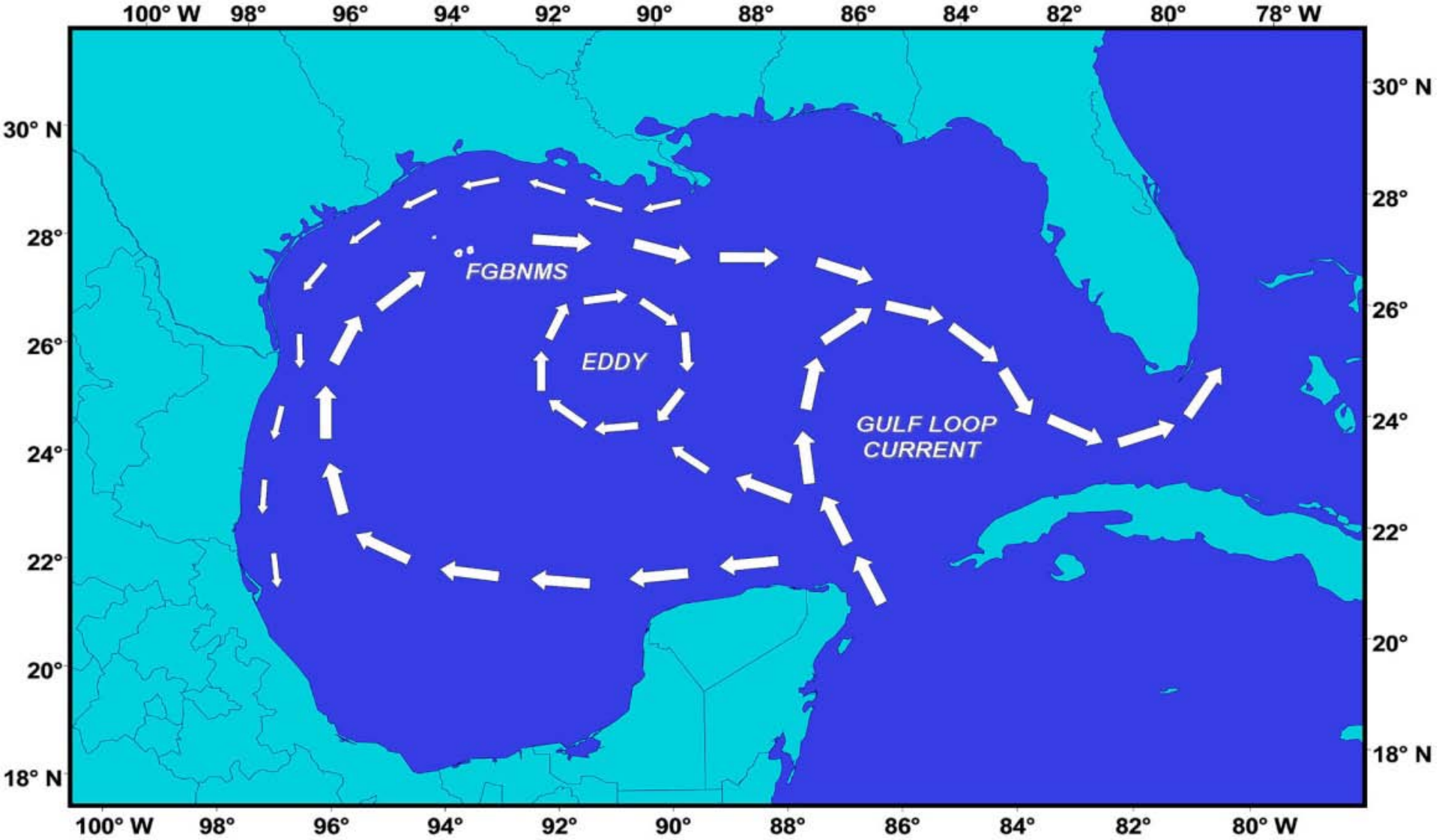
Stu Webster

Tom Stehn

Voluntary Wind Industry Response

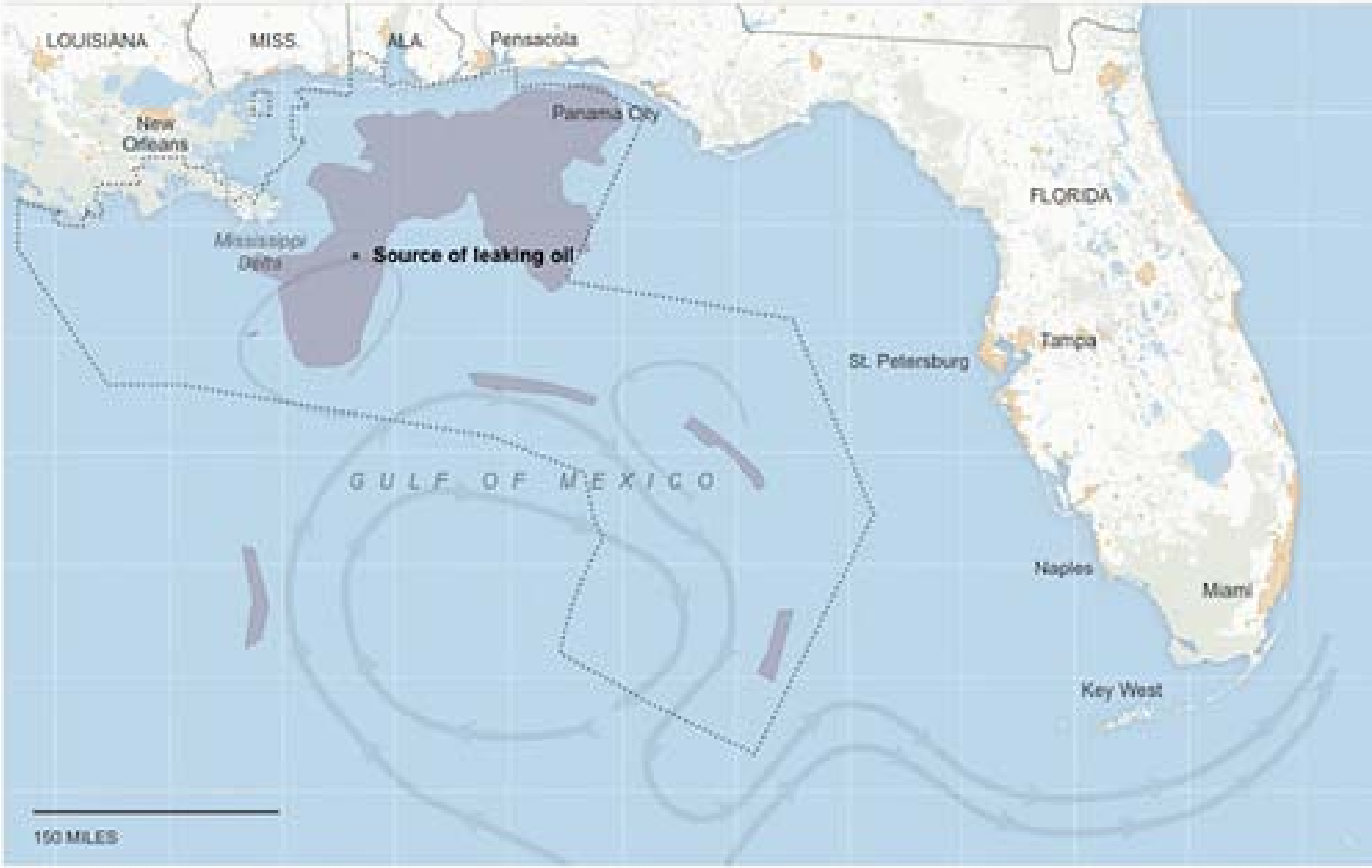
- Bats and Wind Energy Cooperative
- Indiana Bat HCP
- Industry Funded Deterrent R&D
- Cut in speed research
- Extensive pre- and post-construction analysis
- Extensive population analysis
- Extensive behavioral analysis

Aransas NWR & Oil Exploration



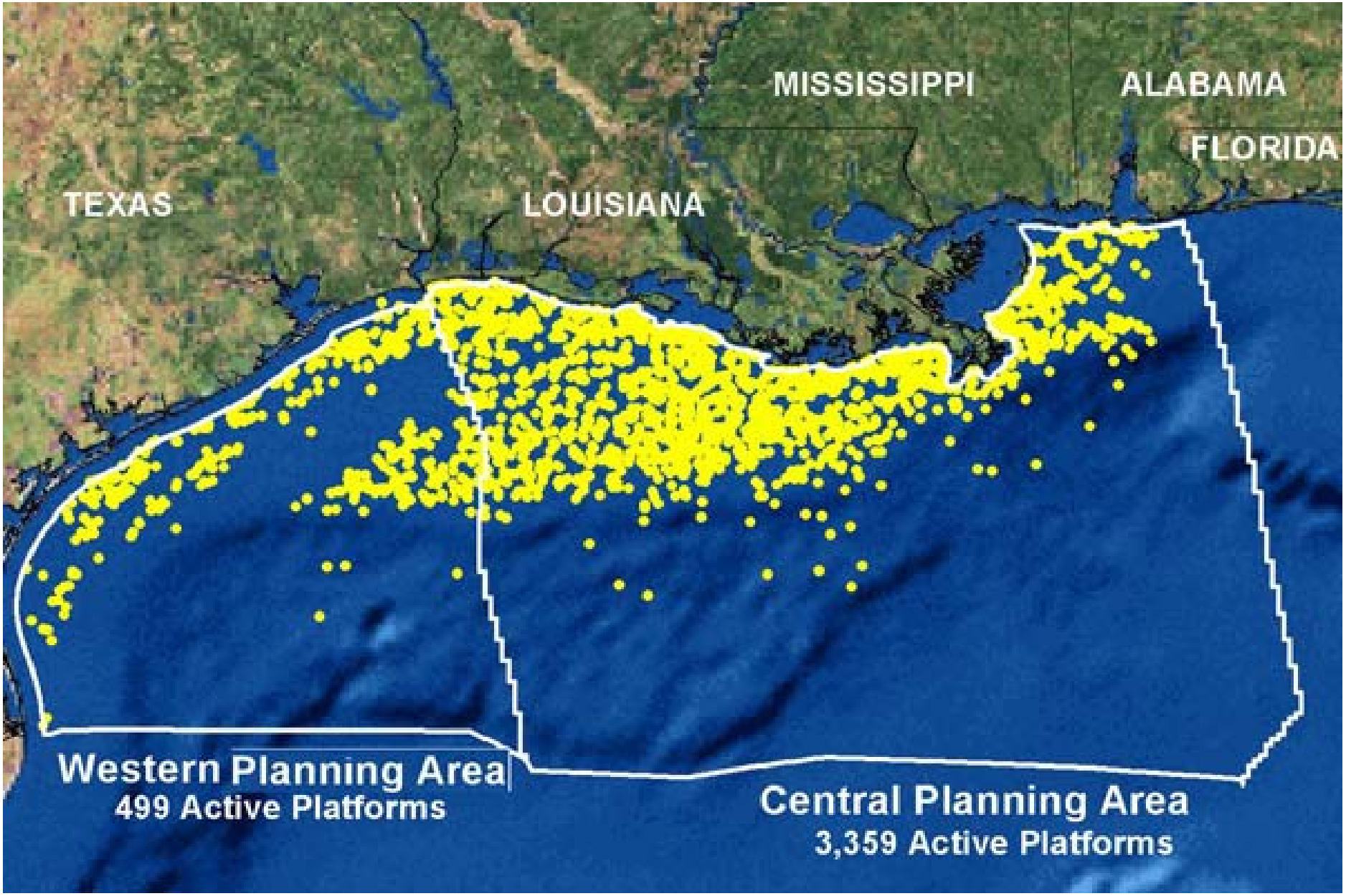
http://flowergarden.noaa.gov/image_library/maps/currents.jpg

Aransas NWR & Oil Exploration



http://farm5.static.flickr.com/4051/4717614858_55b43fb68a.jpg

Aransas NWR & Oil Exploration



http://summitvoice.files.wordpress.com/2011/01/gulf_coast_platforms.jpg

And then came a fight over water . . .

CRANE DEATHS RAISE ALARM ABOUT WATER RIGHTS

23 whoopers died over the winter and biologists blame low river flow

By MATTHEW TRESAUGUE Copyright 2009 Houston Chronicle April 19, 2009

http://www.chron.com/disp/story.mpl/headline/metro/6381765.html

GROUP SUES STATE OVER WHOOPING CRANE DEATHS

By COLIN MCDONALD Copyright San Antonio Express-News

A conservation group filed a federal lawsuit Thursday in Corpus Christi claiming management of the Guadalupe River by the Texas Commission on Environmental Quality has led to the deaths of whooping cranes.

Because the 5-foot-tall birds are endangered and federally protected, the Aransas Project is asking the federal government to establish a habitat conservation plan that would supersede the state's water management.

Last year 23 whooping cranes died on the Texas Coast. The flock that winters in and near the Aransas National Wildlife Refuge is the only self-sustaining population in the world and currently is estimated at 263 birds.

http://thearansasproject.org/basin-management/group-sues-state-over-whooping-crane-deaths/

Tom Stehn, USFWS, Aransas NWR, captures emaciated crane for aid at recovery center. The bird did not survive.

And Guys with Guns . . .

ENDANGERED WHOOPING CRANES WERE SHOT

US Fish and Wildlife Service Offers $12,500 reward for information

Birds were part of a reintroduction program

The cranes are part of the Whooping Crane Eastern Partnership effort to reintroduce whooping cranes into the eastern United States. There are about 570 whooping cranes left in the world, 400 in the wild. About 100 cranes are in the eastern migratory population. The cranes were killed sometime before December 30, 2010 and were discovered and reported by hunters. U.S. Fish and Wildlife Service special agents are leading a joint investigation with Georgia Department of Natural Resources conservation rangers and are now offering a $12,500 reward for information leading to the arrest and successful prosecution of those responsible

http://www.chron.com/disp/story.mpl/headline/metro/6381765.html

GOLDEN EAGLES

Golden Eagles: 73,000 Plus in NA

- Population Estimates in BCR 9, 10, 16, 17 (much of twelve Western states). “We estimate a total of **27,392** Golden Eagles were present in the study area during the late summer, early fall of 2003 excluding military lands, large water bodies and large urban areas (Table 2). This estimate should be considered conservative because it was not possible to adjust estimates for availability bias on or near the transect line, e.g. those birds that were around W but hidden from view during surveys. http://www.fws.gov/mountain-prairie/species/birds/golden_eagle/Final_Golden_Eagle_Report_8_30_04.pdf
- The study area consists of Bird Conservation Regions 9 - Great Basin, 10 - Northern Rockies, 16 - Southern Rockies / Colorado Plateau, and 17 - Badlands and Prairies (North American Bird Conservation Initiative 2000) within the U.S. These regions cover much of the western U.S. and include habitat types ranging from low-elevation sagebrush and grassland basins to high-elevation coniferous forest and mountain meadows
- Research indicates that golden eagles are maintaining static populations in areas undisturbed by humans. The wintering population south of Canada is estimated at **63,000** birds. Aerial surveys conducted by the USFWS in 12 western states show average densities of about 10 golden eagles per 100 square miles (4/100 km2) in midwinter study areas. Golden eagles also winter in parts of Alaska, Canada, and Mexico; however, the number in this latter group would not likely exceed **10,000** birds. http://www.unitedwildlife.com/AnimalsEagles.html

The Altamont Wind Farm & Golden Eagles

- Began Operation ~ 1980
- By 1985 6,700 turbines produced 630,000 kilowatts (94 kilowatt average)
- Down to ~5,400 Turbines by 2005 (West)
- 2011 Turbine Size: 2 to 3 MW
- Repower of Altamont to Maintain 630 MW:
  - 3 MW: 210 Turbines;
  - 1.5 MW: 420 Turbines
- NEER owns 2,400 and will retire all by 2015 and install fewer, newer taller turbines and to locate the turbines outside high-use areas
- Historic Estimated Golden Eagle Deaths range from 24 to 116 per year:
  - 1989–1991: 39 golden eagle turbine-related fatalities per year (Orloff & Flannery 1992)
  - 28-43 (Hunt 1999)
  - 40-60 (Hunt 2002)
  - 75-116 (Smallwood and Thelander 2004, 2005 ("although these estimates were admittedly crude.")
  - 24 (Smallwood & Thelander 2003)
  - 67 (Smallwood & Thelander 2008)
- Estimated turbines today: 4,500 (2,200 have been decommissioned and removed)

Wind, Wildlife, Traffic and Garbage

Altamont Pass, California: I-580, Landfill, Windfarm – Google Earth 6.1.2011

I-580 Altamont Pass, California
Bird Deaths from Traffic: 50-100 Million

Altamont, CA – Google Earth – 6.1.2011

PALM SPRINGS, CALIFORNIA – GOOGLE EARTH, 6.1.2011

LARGER TURBINES REQUIRE GREATER SPACING

BONE, IDAHO – GOOGLE EARTH - 6.1.2011

Is It Altruism or Economics?

BATS

Indiana Bat

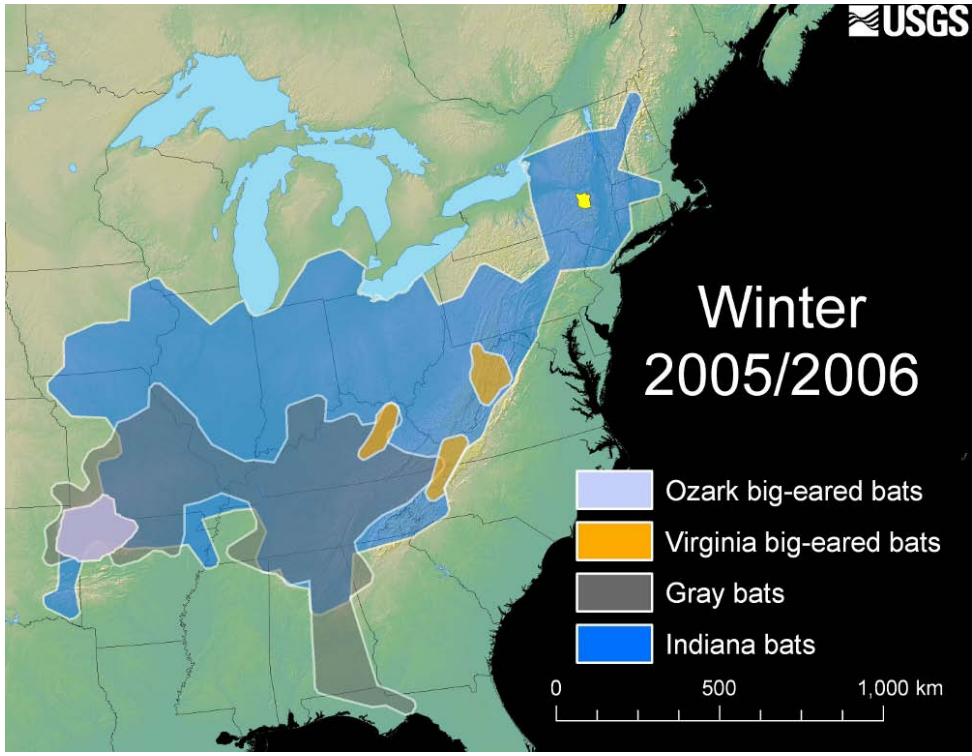
The Indiana bat is an endangered species. It was first listed in 1967 primarily due to episodes of large numbers of Indiana bat deaths caused by human disturbance during hibernation. Indiana bats are extremely vulnerable to disturbance because they hibernate in large numbers in only a few caves (the largest hibernation caves support from 20,000 to 50,000 bats). Other threats that have contributed to the species decline include commercialization of caves, **LOSS OF SUMMER HABITAT**, pesticides and other contaminants, and most recently, the disease **white nose syndrome**.

Indiana bats are found over most of the eastern half of the United States. Almost half of all Indiana bats hibernate in caves in southern Indiana. Other states within the current range of the Indiana bat include Alabama, Arkansas, Connecticut, Illinois, Indiana, Iowa, Kentucky, Maryland, Michigan, Missouri, New Jersey, New York, North Carolina, Ohio, Oklahoma, Pennsylvania, Tennessee, Vermont, Virginia, West Virginia. The 2009 population estimate is about 387,000 Indiana bats, less than half as many as when the species was listed as endangered in 1967.

http://www.fws.gov/Midwest/endangered/mammals/inba/index.html

Threats to Species Survival:

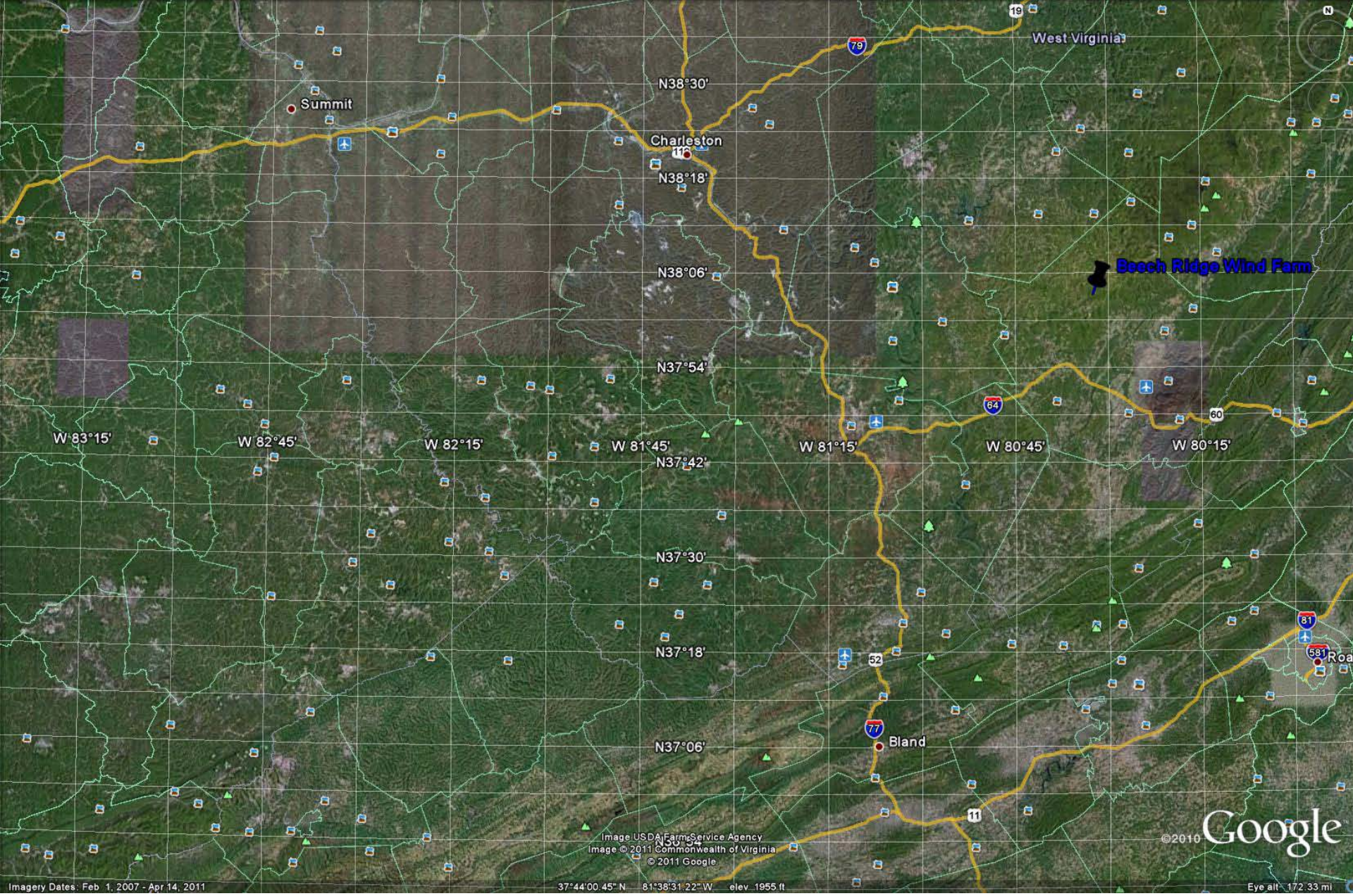
- **White nose syndrome: don't disturb hibernacula; research cause/cure**
- **Loss of summer Habitat**



http://www.fort.usgs.gov/wns/

Voluntary Wind Industry Response

- Bats and Wind Energy Cooperative
- Industry Funded Deterrent R&D
- Cut in speed research
- Extensive pre- and post-construction analysis
- Extensive population analysis
- Extensive behavioral analysis
- Region 3 Multi-Species HCP



W.VA/KY MtnTopCoal

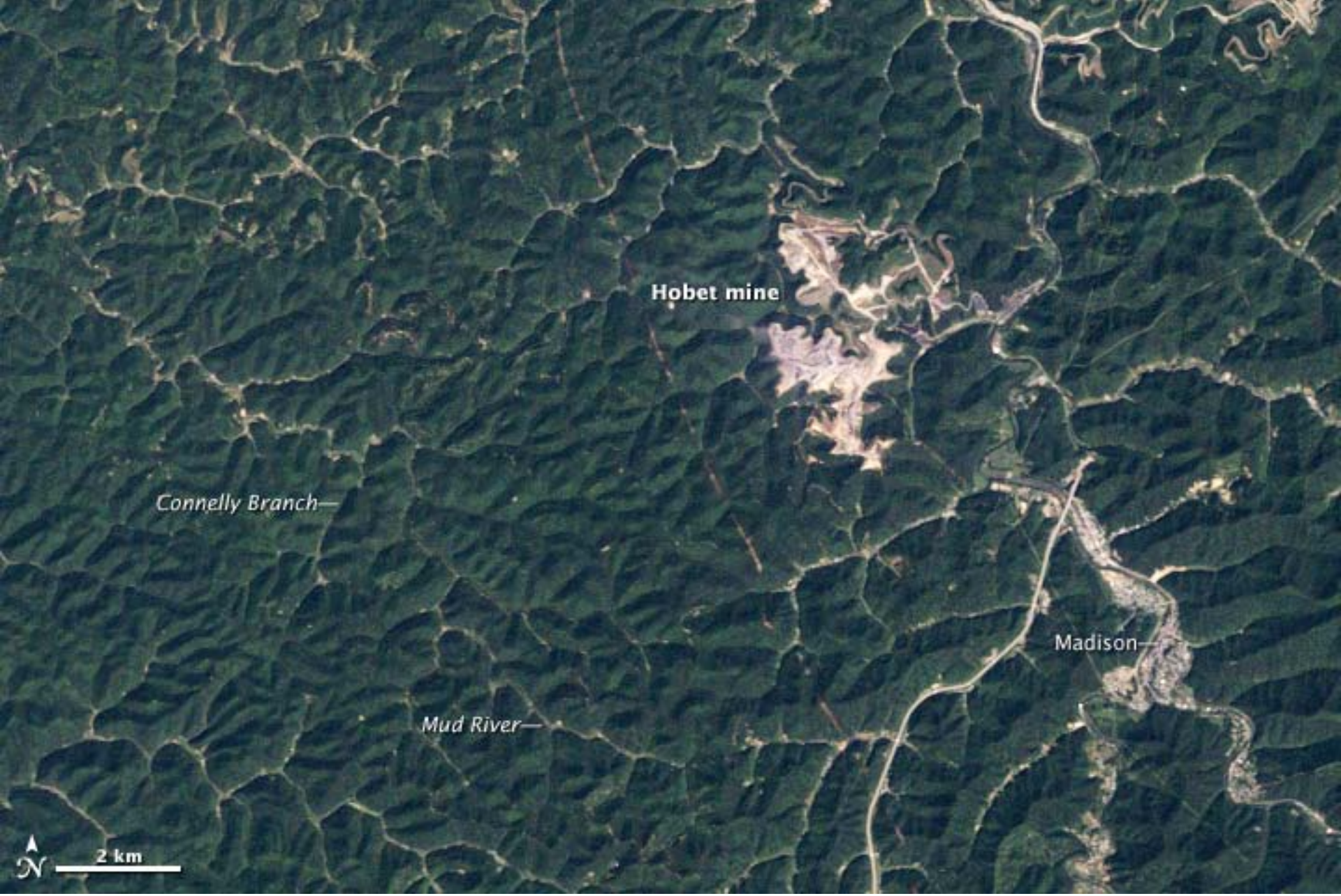
Google Earth – 6.1.2011

Beech Ridge Wind Farm

- Judicial Finding: Wind farm could take a bat during operating years of operation
- Response: Project HCP is in the works
- No additional construction until HCP is in place
- Summer Nights operations curtailment

Indiana Bat Threats

- Scientists are working on white nose Syndrome
- Wind is studying Indiana Bat behavior
- What about loss of summer habitat?
  - Let’s take a look . . .



HOBET MINE 1984

http://earthobservatory.nasa.gov/Features/WorldOfChange/hobet.php

HOBET MINE 1986

http://earthobservatory.nasa.gov/Features/WorldOfChange/hobet.php

HOBET MINE 1988

http://earthobservatory.nasa.gov/Features/WorldOfChange/hobet.php

HOBET MINE 1991

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http://earthobservatory.nasa.gov/Features/WorldOfChange/hobet.php

HOBET MINE 2000

http://earthobservatory.nasa.gov/Features/WorldOfChange/hobet.php

HOBET MINE 2006

http://earthobservatory.nasa.gov/Features/WorldOfChange/hobet.php

HOBET MINE 2002

http://earthobservatory.nasa.gov/Features/WorldOfChange/hobet.php

HOBET MINE 2004

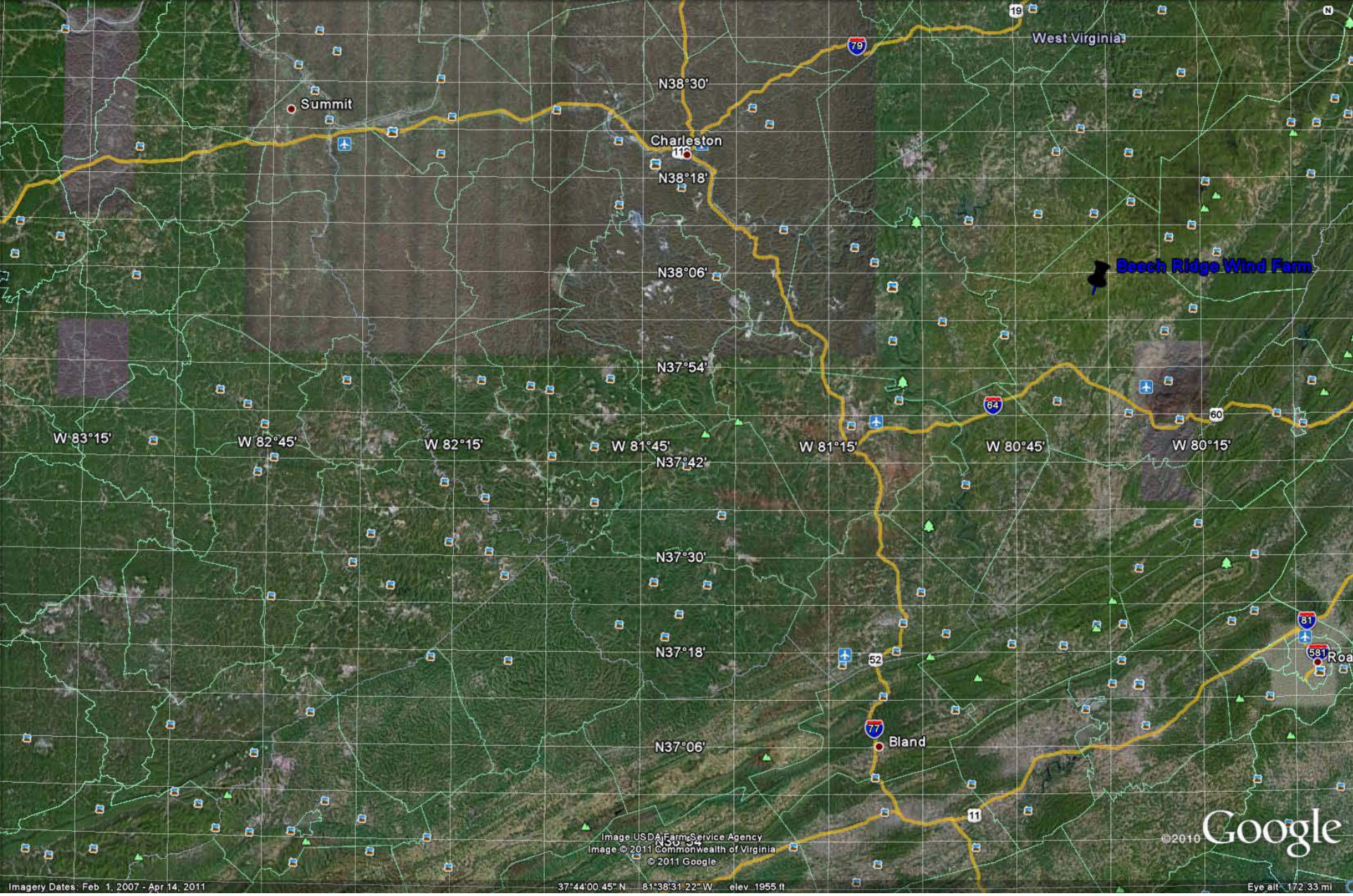
http://earthobservatory.nasa.gov/Features/WorldOfChange/hobet.php

HOBET MINE 2008

http://earthobservatory.nasa.gov/Features/WorldOfChange/hobet.php

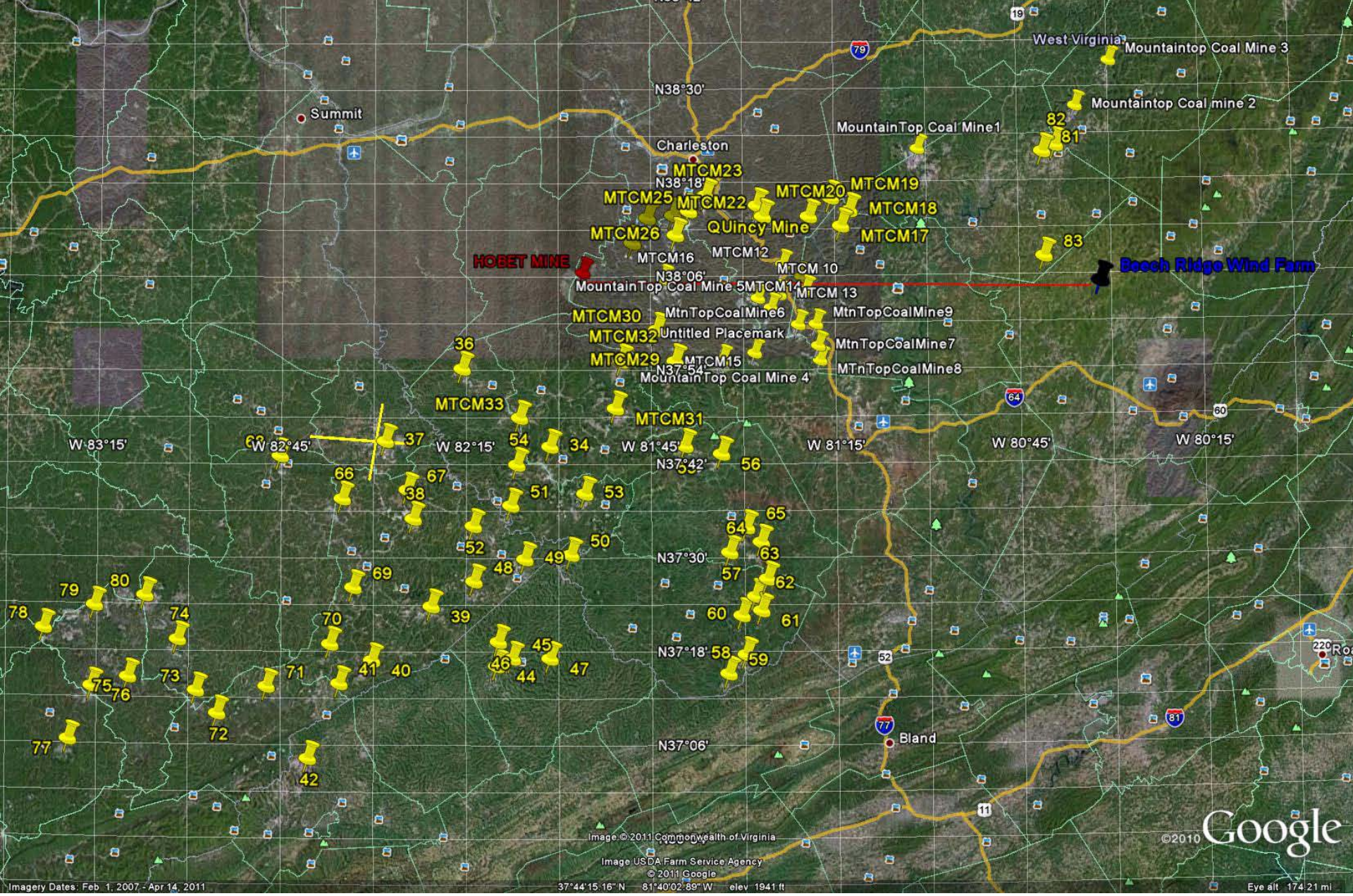
HOBET MINE 2009 Eight Point Three (8.3) Miles Across

http://earthobservatory.nasa.gov/Features/WorldOfChange/hobet.php



Beech Ridge Wind Farm

Google Earth – 6.1.2011



W.VA/KY MtnTopCoal

Google Earth – 6.1.2011

SAGE GROUSE

Sage Grouse: Warranted, but Precluded

THREATS TO SAGE GROUSE	
Threat (Range wide)	**Relative Rank**
Invasive Plants	70
Infrastructure	68
Wildfire	52
Agriculture	50
Detrimental Grazing	42
Oil and Gas Development	40
Urbanization	39
Coal Strip Mining	37
Weather	33
Conifer Invasion	32
Human	29
Predation	29
Disease	21
Water Developments	18
Prescribed Fire	14
Hard Rock Mining	12
Hunting	10
Climate Change	8
Contaminants	3

http://www.mt.nrcs.usda.gov/technical/ecs/biology/sagegrouse/issues.html

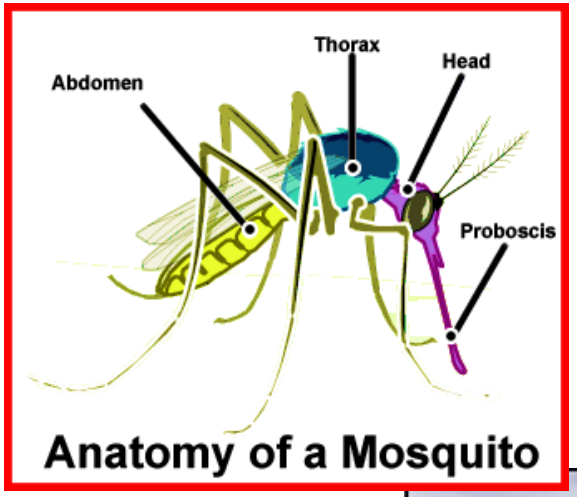
Threats to Greater	Sage Grouse in ID
Threat (range wide)	Rank
Wildfire	98
Infrastructure	90
Annual Grassland	78
Livestock Impacts	52
Human Impacts	49
West Nile Virus	45
Prescribed Fire	41
Seeded Perennial	37
Climate Change	35
Conifer Growth	32
Isolated populations	30
Predation	27
Urban Development	26
Sagebrush control	23
Insecticides	22
Ag Expansion	21
Sport Hunting	17
Mine/landfill/gravel	15
Falconry	4

http://fishandgame.idaho.gov/hunt/grouse/conserve_plan/Chap4_July06_r.pdf

Sage Grouse Threats

1 Wildfire
2 Infrastructure
3 Annual grassland
4 Livestock impacts
5 Human disturbance
6 West Nile Virus
7 Prescribed fire
8 Seeded perennial grassland
9 Climate change
10 Conifer encroachment
11 Isolated populations
12 Predation
13 Urban/exurban development
14 Sagebrush control
15 Insecticides
16 Agricultural expansion
17 Sport hunting
18 Mines, landfills, gravel pits
19 Falconry

IDF&G Sage Grouse Conservation Plan

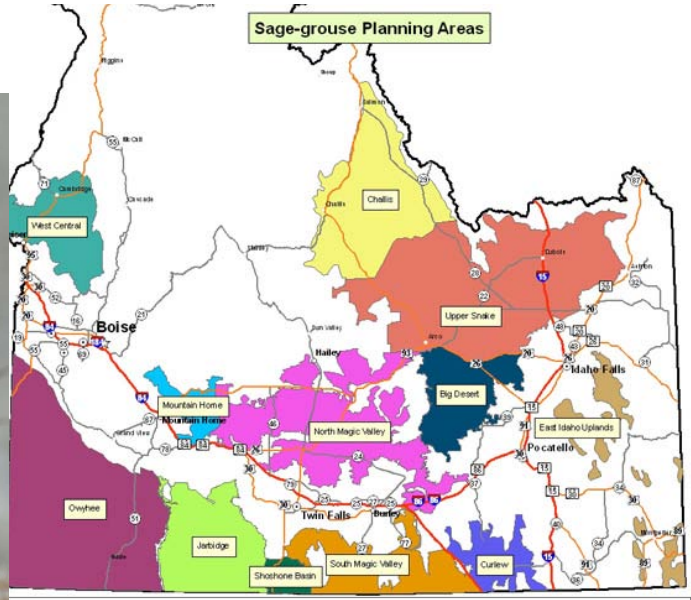


Voluntary Wind Industry Response

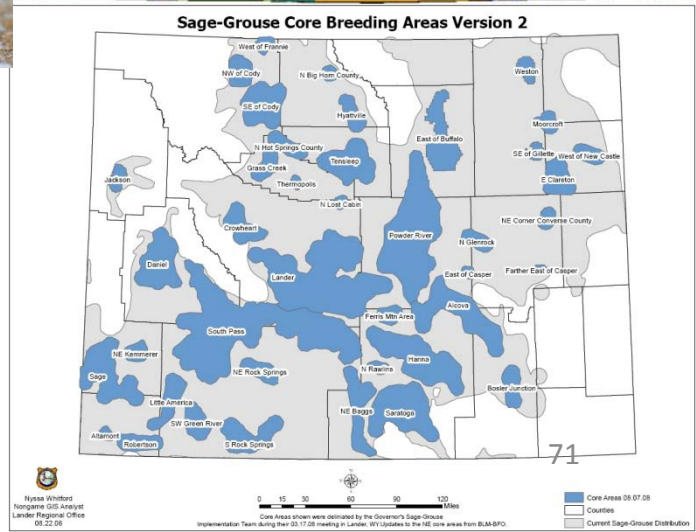
NWCC Wind/Wildlife Sage Grouse Committee

STEERING COMMITTEE

- **Industry**
  - Christina Calabrese, Horizon Wind Energy
  - Joe Grennan, RES Americas
  - Karin Coppinger, Invenergy
  - Nicole Hugher, Element
  - Rich Rayhill, Ridgeline Energy, LLC
- **State Agencies**
  - John Emmerich, Wyoming Game & Fish
  - Scott Gardner, California Fish and Game
  - Tom Hemker, Idaho Fish and Game
  - Holly Michael, Oregon Fish and Wildlife
- **NGOs**
  - Kevin Doherty, Audubon Wyoming
  - Joe Kiesecker, The Nature Conservancy
- **Federal Agencies**
  - Zachary Bowen, U.S. Geological Survey
  - Robin Sell, Bureau of Land Management
  - Christy Johnson-Hughes, USFWS
- **Scientific/Academic**
  - Dave Naugle, University of Montana
  - Jim SedingerUniversity of Nevada
- **Technical Monitor**
  - Karin Sinclair, National Renewable Energy Laboratory
- **Facilitation Team**
  - Abby Arnold, Kearns & West
  - Jennifer Bies, Kearns & West



Studies have been funded and are underway: 2 in Wyoming; 1 in Idaho. $1 Million has been spent.



CALIFORNIA CONDOR

- Remarkable recovery story
- Wind HCP process is underway

ANTHROPOGENIC COMPARISONS

Cause	Range
Buildings/Glass	100 Million to 1 Billion
Roads/Vehicles	10.7 to 292 Million
Power Lines	10 to 174 Million
Towers	4 to 50 Million
Oil & Gas	1 to 2 million

What is required of these sources of avian mortality from a guidelines/guidance standpoint?

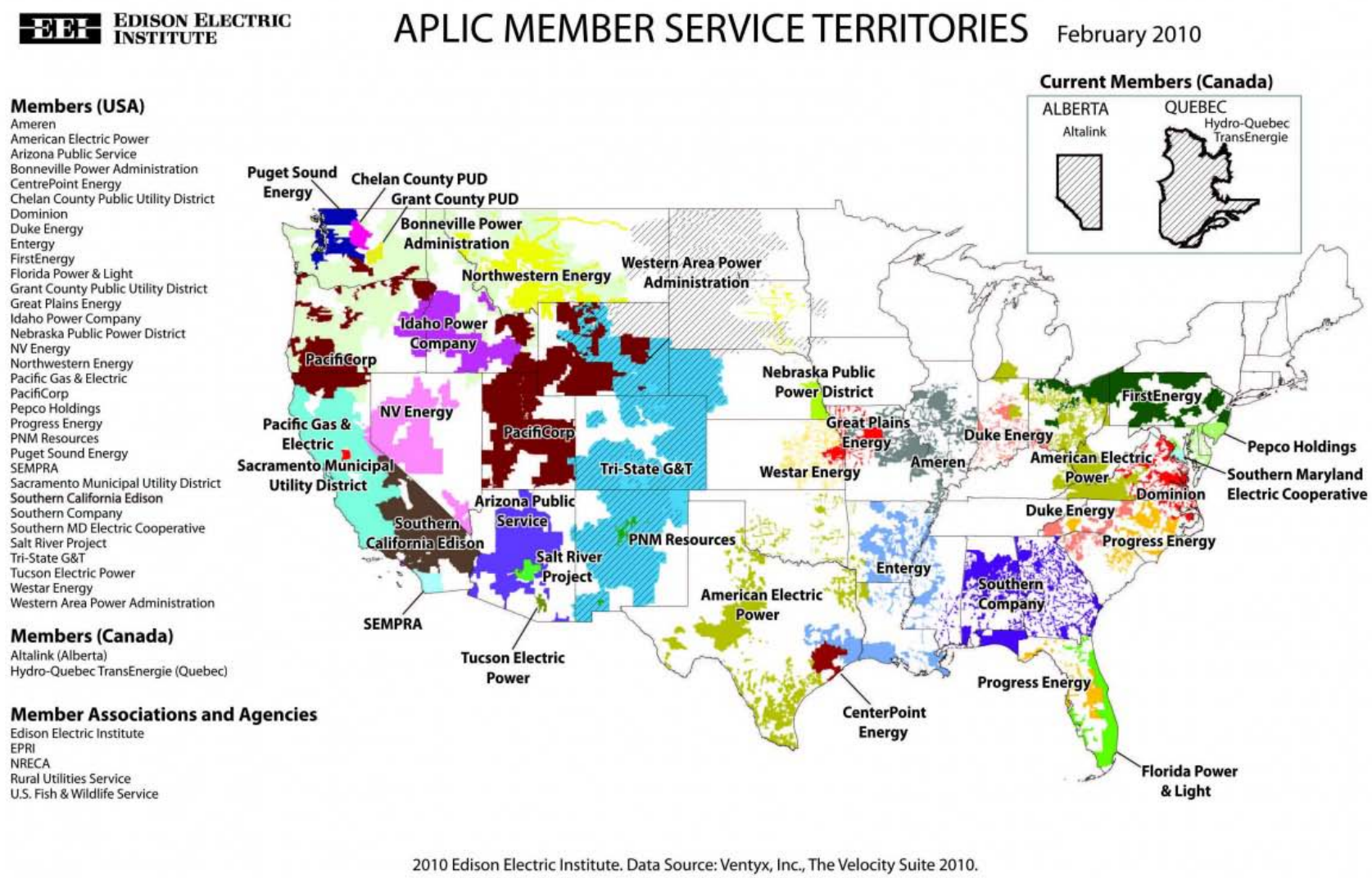
Comparison of Communication Tower & Wind Turbine Siting Guidance

	Guidance on Communications Towers	Guidance on Wind Turbines
Mortality attributable	4 million to 50 million birds per year	100,000 birds per year
Voluntary vs. Mandatory	Voluntary	Voluntary
Length	2 pages plus 2 ½ page cover letter	60 pages plus appendices
Recommendation on length of pre-construction monitoring	None	Minimum of three years
Recommendation on length of post-construction monitoring	None	Three to five years
Compensatory mitigation	None required	Recommended
Adaptive management	None required	Recommended

Comparison of USFWS APLIC APP & Wind Turbine Siting Guidance

	Guidance on Power Lines	Guidance on Wind Turbines
Mortality attributable	4 million to 50 million birds per year	100,000 birds per year
Voluntary vs. Mandatory	Voluntary	Voluntary
Length	3 Paragraphs	60 pages plus appendices
Recommendation on length of pre-construction monitoring	None	Minimum of three years
Recommendation on length of post-construction monitoring	None	Three to five years
Compensatory mitigation	None required	Recommended
Adaptive management	None required	Recommended

Avian Power Line Interaction Committee



APLIC APP Voluntary Guidance for Siting Powerlines: Should, Could, May

Paragraph 6: *Avian Reporting System* Although reporting of avian mortalities may be required as a condition of Federal or State permits, **a utility may also choose to voluntarily monitor relevant avian interactions, including mortalities, through the development of an internal reporting system**. An APP should consider providing for the development of such a reporting system, which can help a company pinpoint areas of concern by tracking both the specific locations where mortalities may be occurring, as well as the extent of such mortalities. Data collected by company personnel can be limited to avian mortalities or injuries, or could be expanded to include historical tracking of avian nest problems, particularly problematic poles or line configurations, as well as remedial actions taken. All data should be regularly entered into a searchable database compatible for use in additional analysis (see Risk Assessment Methodology below). Bird Mortality Tracking System software developed by APLIC is available for free upon request at http://aplic.org.

Paragraph 7. *Risk Assessment Methodology* A utility can have the greatest impact on reducing avian mortality by focusing its efforts in a cost-effective manner on the areas that pose the greatest risk to migratory birds. Therefore, as a general matter, an APP should include a method for evaluating the risks posed to migratory birds in a manner that identifies areas and issues of particular concern. A risk assessment study will often begin with an assessment of available data addressing areas of high avian use, avian mortality, nesting problems, established flyways, adjacent wetlands, prey populations, perch availability, effectiveness of existing procedures, remedial actions and other factors that can increase avian interactions with utility facilities. The avian reporting system discussed in the previous section is an integral component of this risk assessment, as well as the use of avian experts, birders, and biologists who can provide additional information on avian distribution. An APP also may provide for the **development of models that will enable a company to utilize biological and electrical design information to prioritize poles most in need of modifications**, as well as research on the varied causes of avian mortality and the benefits of utility structures to avian species.

8. *Mortality Reduction Measures*

After completing a risk assessment, a company can focus its efforts on areas of concern, **ensure that the activities taken by the utility are not out of proportion to the risks encountered by migratory birds, and then determine whether an avian mortality reduction plan needs to be implemented in certain areas**. An APP could implement this approach by developing such a risk reduction plan, utilizing risk assessment results to direct where system monitoring should occur, where retrofit efforts should be focused, and where new construction warrants special attention to raptor and other bird issues. If a utility finds that implementation of such avian protection measures is appropriate, it also may choose to develop a schedule for implementation.

http://www.fws.gov/migratorybirds/CurrentBirdIssues/Hazards/APP/AVIAN%20PROTECTION%20PLAN%20FINAL%204%2019%2005.pdf

Buildings/Windows

- Biggest Killer
- No Window Innovation or marking is required
- Not even on new construction
- Up front costs during construction are easier to absord than retrofit
- Could start a whole new industry

What About the Other Threats?

- Offshore Oil
- Oil & Gas
- Mountain Top Coal
- Western Strip Mining
- Highways
- The list goes on . . .

What is the Reality?

- Wind is the only source of energy that does not present population-level risks to birds, according to a study of coal, oil, natural gas, nuclear, hydroelectric, and wind power. [3]
- Wind turbines are estimated to cause less than three out of every 100,000 (.0003) human-related bird deaths in the U.S., and will never cause more than a very small fraction no matter how extensively wind power is used in the future, the National Academy of Sciences found. 4
- Wind power causes far fewer losses of birds (approximately 108,000 a year) than buildings (550 million), power lines (130 million), cars (80 million), poisoning by pesticides (67 million), domestic cats (at least 10 million), and radio and cell towers (4.5 million). 5
- Non-renewable energy sources "pose higher risks to wildlife" than renewable sources. Coal - which wind directly replaces - "is by far the largest contributor" to wildlife risks. 6

[1] " Windmills Are Killing Our Birds," Robert Bryce op-ed in the Wall Street Journal, September 7, 2009

[2] "Bird Deaths from Wind Farms to Continue Under New Federal Voluntary Industry Guidelines," American Bird Conservancy press release, February 8, 2011

3 & 6 "Comparison Of Reported Effects And Risks To Vertebrate Wildlife From Six Electricity Generation Types In The New York/New England Region," New York State Research and Development Authority, March 2009

4 "Environmental Impacts of Wind-Energy Projects," National Academy of Sciences, 2007

5"A Summary and Comparison of Bird Mortality from Anthropogenic Causes with an Emphasis on Collisions," USDA Forest Service, 2005

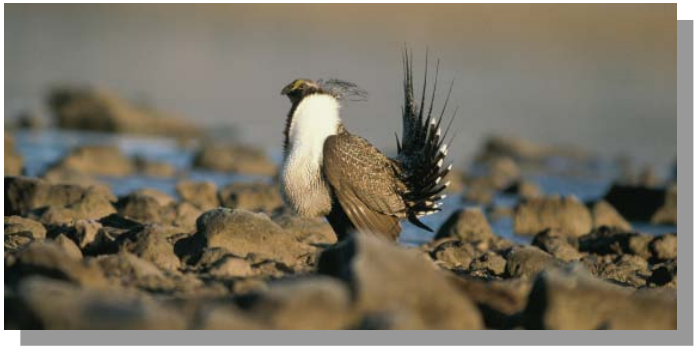
Wind Turbine Siting Guidelines Federal Advisory Committee

Federal Caucus

Mr. David J. Stout *Chairman,* ***U.S. Fish & Wildlife Service***
Mr. Steve Lindenberg ***U.S. Department of Energy***
Dr. Robert Robel ***Kansas State University***

State/Tribal Caucus

Ms. Kathy Boydston ***TX Parks & Wildlife Department***
Mr. Scott Darling ***VT Fish & Wildlife Department***
Chairman Karen Douglas ***CA Energy Commission***
Mr. Greg Hueckel ***WA Department of Fish & Wildlife***
Ms. Jeri Lawrence ***Blackfeet Nation***
Mr. Mark Sinclair ***Clean Energy States Alliance***
Mr. Keith Sexson ***Assn. of Fish & Wildlife Agencies***



NGO Caucus

Dr. Taber Allison ***Massachusetts Audubon***
Dr. Ed Arnett ***Bat Conservation International***
Mr. Mike Daulton ***National Audubon Society***
Ms. Aimee Delach ***Defenders of Wildlife***
Mr. Robert Manes ***The Nature Conservancy, KS***

Industry Caucus

Mr. Michael Azeka ***AES Wind Generation***
Ms. René Braud ***Horizon Wind Energy***
Mr. Andrew O. Linehan ***Iberdrola Renewables***
Ms. Winifred Perkins ***NextEra Energy Resources***
Mr. Steven Quarles ***Crowell & Moring LLP***
Mr. Rich Rayhill ***Ridgeline Energy, LLC***
Mr. Patrick D. Traylor ***Hogan & Hartson, LLP***

AWWI Partners 2011 (and Friends)

ASSOCIATION of FISH & WILDLIFE AGENCIES

Audubon

AWEA AMERICAN WIND ENERGY ASSOCIATION

bp BP Wind Energy

EDF ENVIRONMENTAL DEFENSE FUND Finding the ways that work

enXco An EDF EN Company

GE Energy

Horizon Wind Energy An EDF Renewables Company

IBERDROLA RENEWABLES

NATIONAL WILDLIFE FEDERATION

NRDC THE EARTH'S BEST DEFENSE

The Nature Conservancy Protecting nature. Preserving life.

NRG SYSTEMS

PG&E

res AMERICAS powering change

RIDGELINE ENERGY

SIERRA CLUB FOUNDED 1892

Union of Concerned Scientists

Vestas

AES the power of being global

CLEAN LINE ENERGY PARTNERS

firstwind. CLEAN ENERGY MADE HERE

NEXTera ENERGY RESOURCES

Pattern

Not to belabor the point . . .

- Wyoming Oil & Gas -Sage Grouse HCP
- Western Gulf Offshore Oil Drilling Whooping Crane HCP
- Mountain Top Coal Mining Indiana Bat HCP
- Utility Distribution Line Golden Eagle/Raptor HCP
- Sheep/Cattle Rancher Golden Eagle HCP
- Gulf Coast Chemical Refinery MBTA HCP
- Gas Fracking Groundwater Contaminant Cooperative
- N. American Architects & Builders for Safer Windows
- Birders & Girders For Avian Safety

What is Driving What Appears to Be less tolerant federal Policy?

- National Pro-oil, gas, coal Policy?
  - Wind has executive orders, Secretarial directives, goals, targets, accelerations, etc., just like other forms of electricity
- Carcasses?
  - Power lines, towers, buildings, oil all have similar images
- Because we have shared data?
  - Altamont
  - Bats
  - With AWWI Research Information System there will likely be a great deal more data released.
- Is it because Wind is responsive?
  - Takes calls, engages in processes, willing to collaborate
- New Industry?
- Lack of money, political muscle?
- Green brand a higher standard?

Are the Regulations Impacting Species Survival?

- If we took out every wind turbine and never built another, we could save 100,000 birds but lose a tool in our fight against climate change.
- Is that a statistically signigicant number?