Shelter from the Storm

Increasing Beneficial Use of Disaster Debris

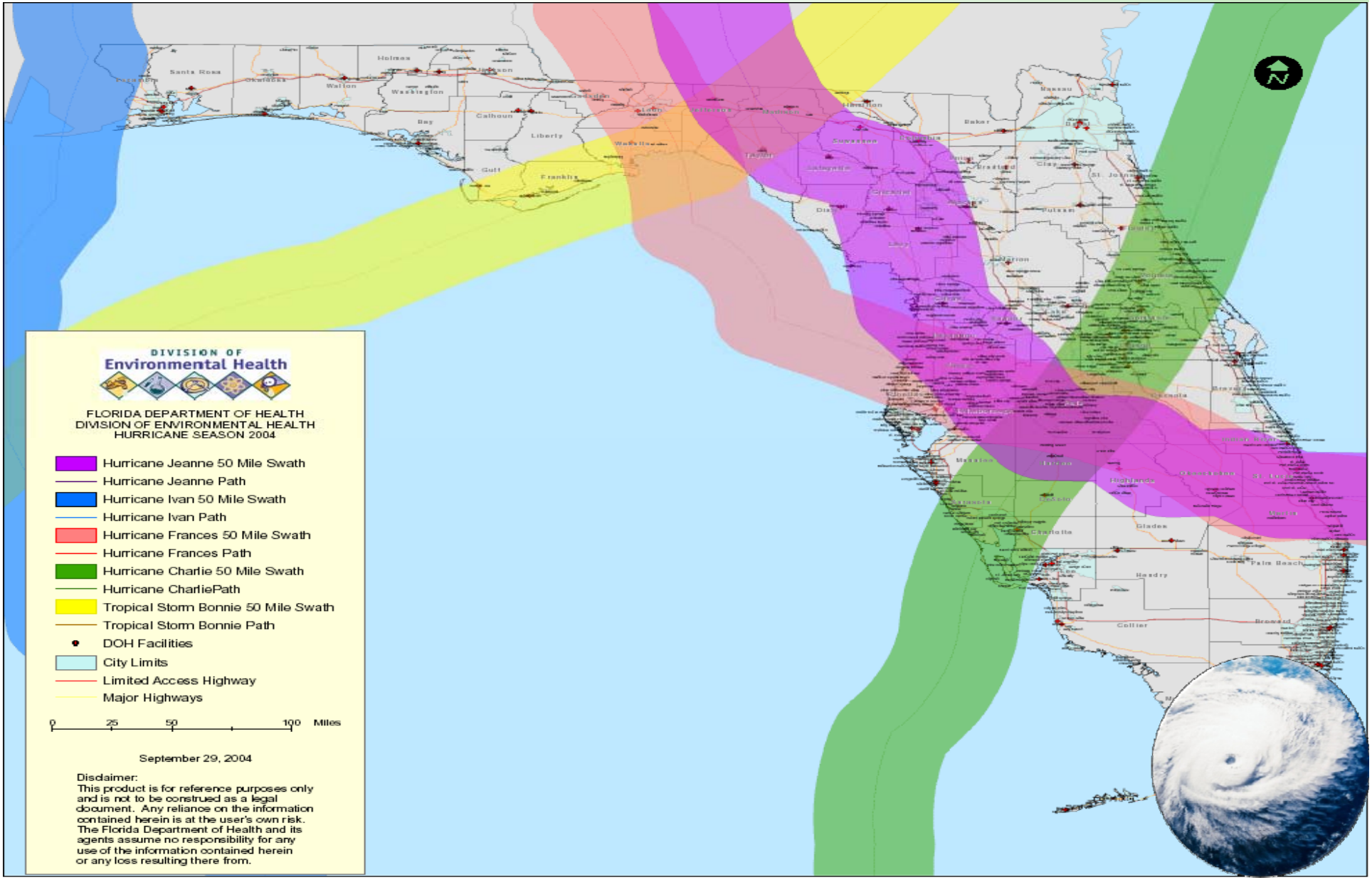
Michael Alexander

NEWMOA Web Session

July 17, 2008

kessler consulting inc.
Innovative waste solutions

Florida Hurricane Season 2004



Hurricanes of 2004

Landfall Stats				
Name	**Where**	**When**	**Category**	**Winds (mph)**
Charley	Punta Gorda, FL	Aug. 14	4	145
Frances	Hutchinson, FL	Sept. 6	3	120
Ivan	Pine Beach, AL	Sept. 16	3	120
Jeanne	Hutchinson, FL	Sept. 26	3	120

kessler consulting inc.
innovatice waste solutions

Florida Hurricane Season 2005

DIVISION OF
Environmental Health

Florida Department of Health
Hurricane Season 2005

Storm Path

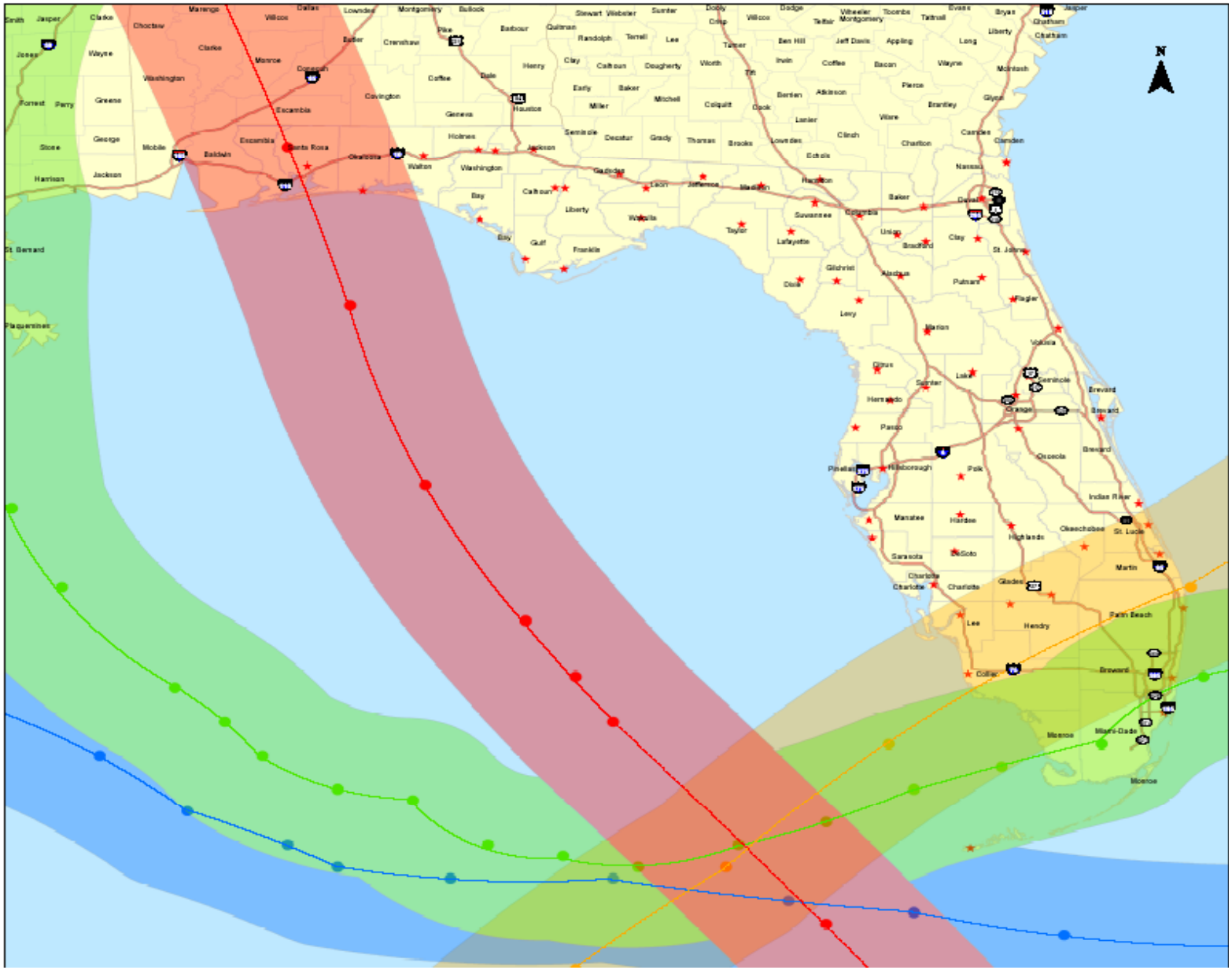
- Hurricane Dennis
- Hurricane Katrina
- Hurricane Rita
- Hurricane Wilma

50 Mile Swath

- Hurricane Dennis
- Hurricane Katrina
- Hurricane Rita
- Hurricane Wilma

Hurricane Center

- Hurricane Dennis
- Hurricane Katrina
- Hurricane Rita
- Hurricane Wilma
- County Health Department



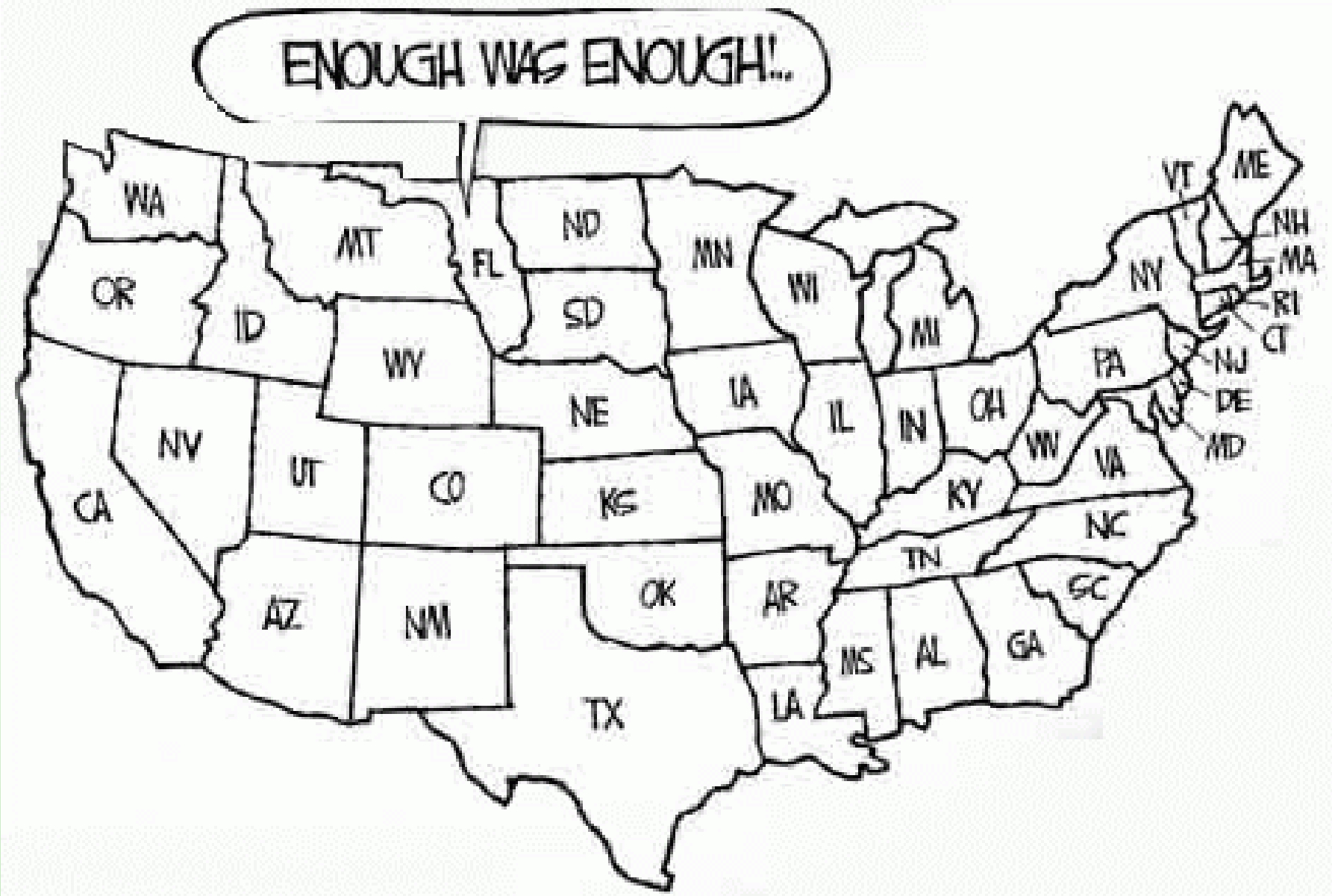
0 25 50 100 Miles

Disclaimer:
This product is for reference purposes only and is not to be construed as a legal document. Any reliance on the information contained herein is at the user's own risk. The Florida Department of Health and its agents assume no responsibility for any use of the information contained herein or any loss resulting there from.
Map printed October 17, 2005.

Hurricanes of 2005

Landfall Stats				
Name	**Where**	**When**	**Category**	**Winds (mph)**
Dennis	Santa Rosa, FL	July 10	3	120
Katrina	Hallendale, FL	Aug. 25	1	90
Rita	Florida Keys	Sept. 20	2	100
Wilma	Cape Romano, FL	Oct. 24	3	120

kessler consulting inc.
innovatice waste solutions



kessler consulting inc.
innovatice waste solutions

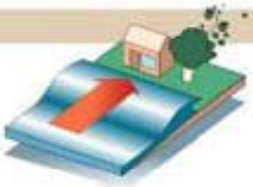
Saffir-Simpson Scale

CATEGORY 1

Barometric pressure: 28.94
Winds: 74 to 95 mph
Storm surge: 4 to 5 feet
Damage: Minimal; signs, tree branches, power lines down

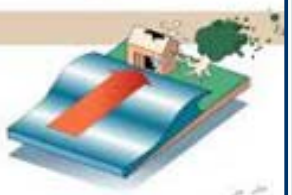
CATEGORY 2

Barometric pressure: 28.50 to 28.93
Winds: 96 to 110 mph
Storm surge: 6 to 8 feet
Damage: Moderate; larger signs, tree branches blown down



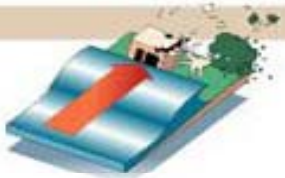
CATEGORY 3

Barometric pressure: 27.91 to 28.49
Winds: 111 to 130 mph
Storm surge: 9 to 12 feet
Damage: Extensive; minor damage to buildings, trees blown down



CATEGORY 4

Barometric pressure: 27.17 to 27.90
Winds: 131 to 155 mph
Storm surge: 13 to 18 feet
Damage: Extreme; almost total destruction of doors, windows



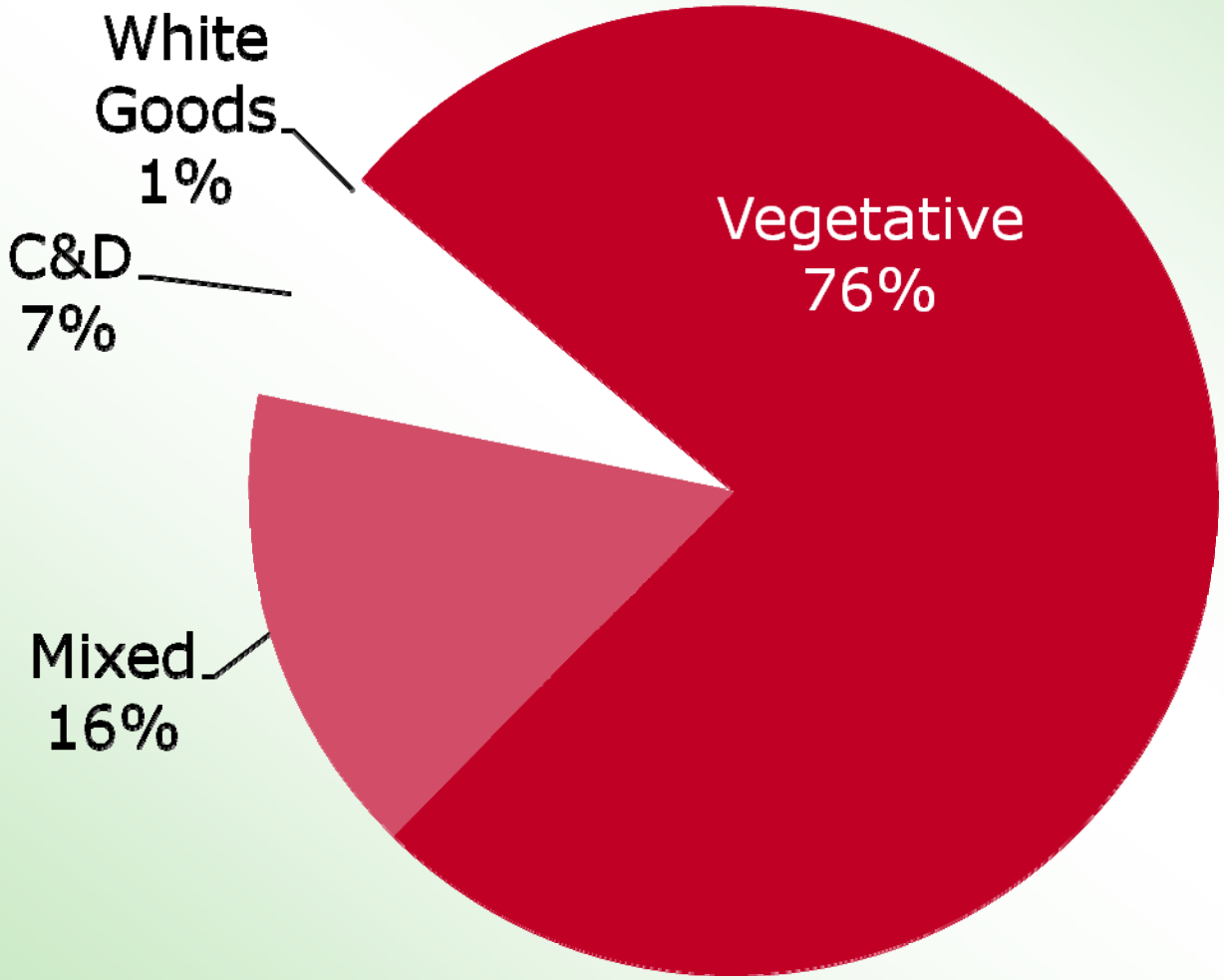
CATEGORY 5

Barometric pressure: Less than 27.17
Winds: More than 155 mph
Storm surge: More than 18 feet
Damage: Catastrophic; buildings, roofs, structures destroyed

Source: Palm Beach Post

kessler consulting inc.
innovatice waste solutions

Storm Debris by Type



kessler consulting inc.
innovatice waste solutions

Storm Debris by Type

kessler consulting inc.
innovatice waste solutions

Storm Debris by Type

kessler consulting inc.
innovatice waste solutions

Storm Debris by Type

kessler consulting inc.
innovatice waste solutions

Storm Debris by Type

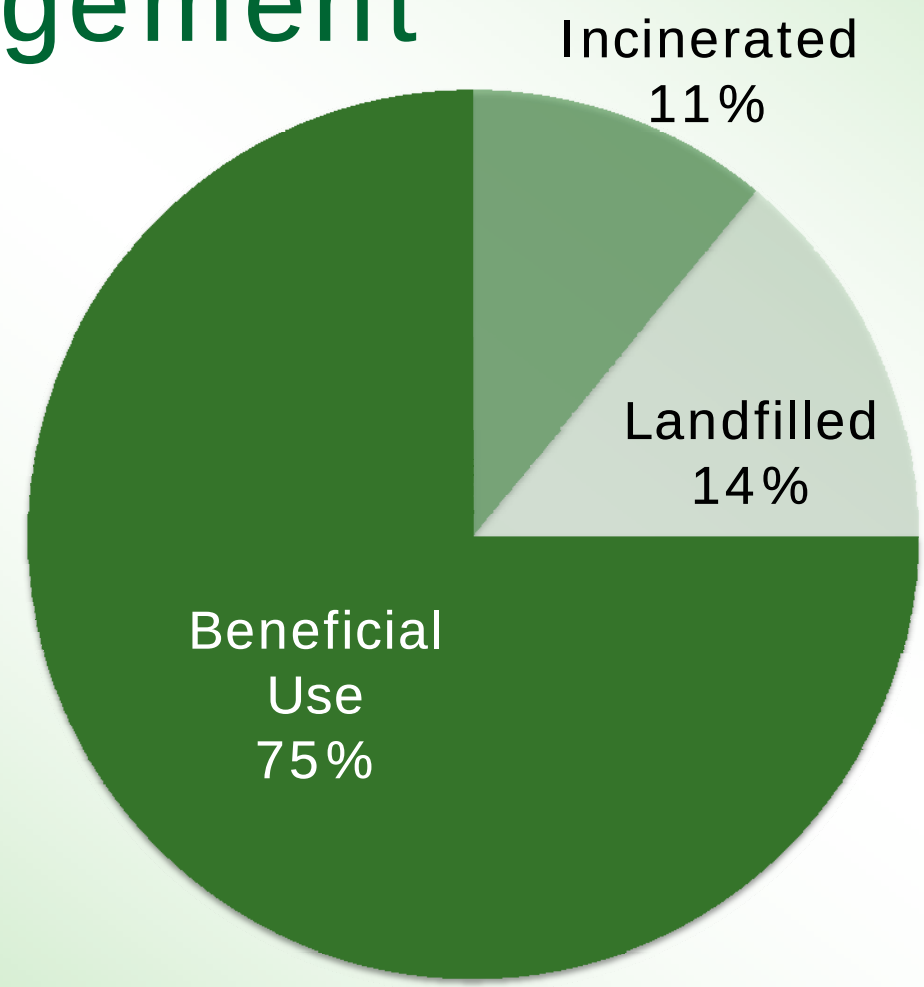
kessler consulting inc.
innovatice waste solutions

Methods for Managing Vegetative Disaster Debris

- Landfilling
- Burning in pits or air-curtain incinerators
- Beneficial uses, such as:
  - composting
  - land spreading
  - soil amendment (agricultural applications)
  - fuel in industrial boilers

kessler consulting inc.
innovatice waste solutions

Vegetative Storm Debris Management



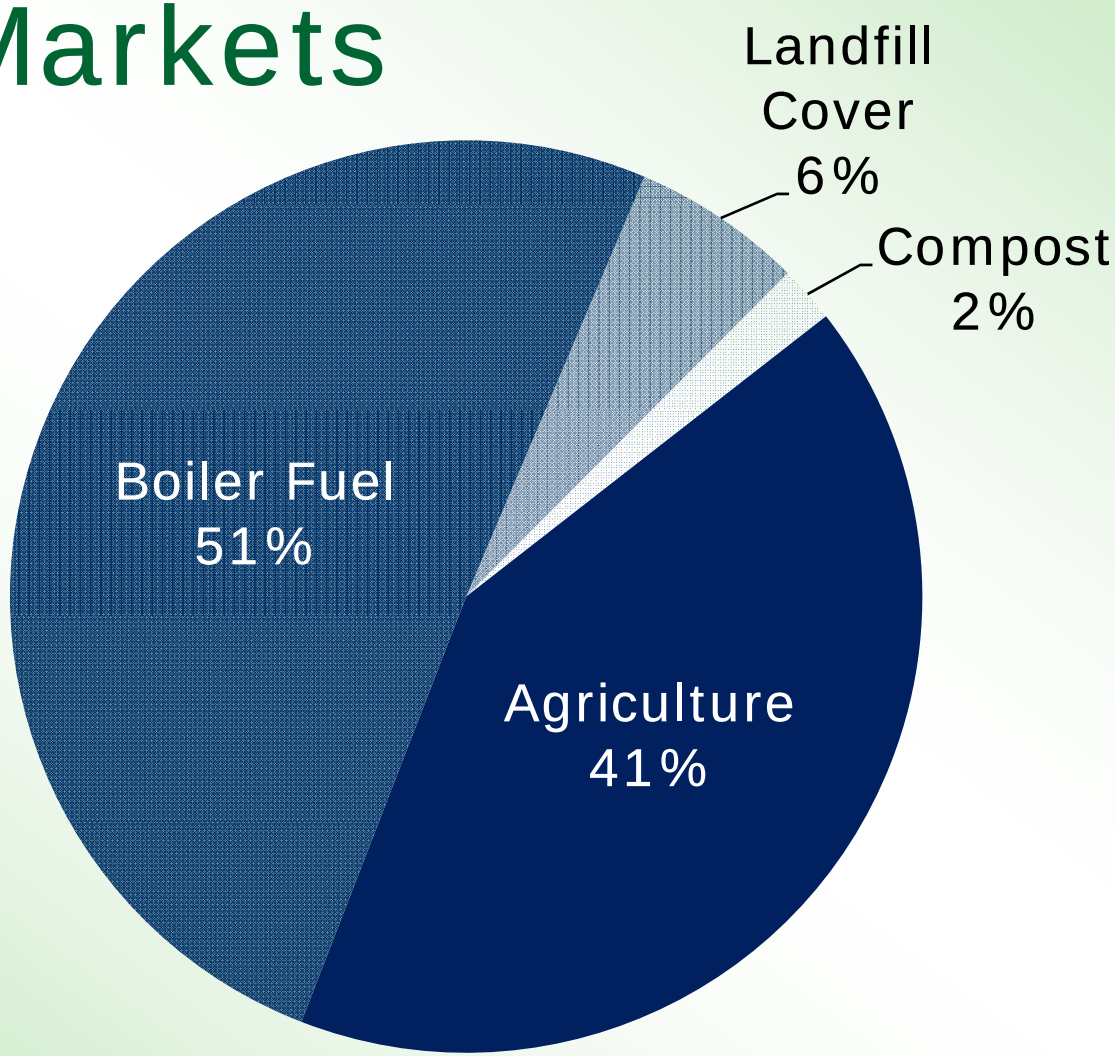
kessler consulting inc.
innovatice waste solutions

Mulch from Vegetative Disaster Debris

Source: Common Purpose Institute

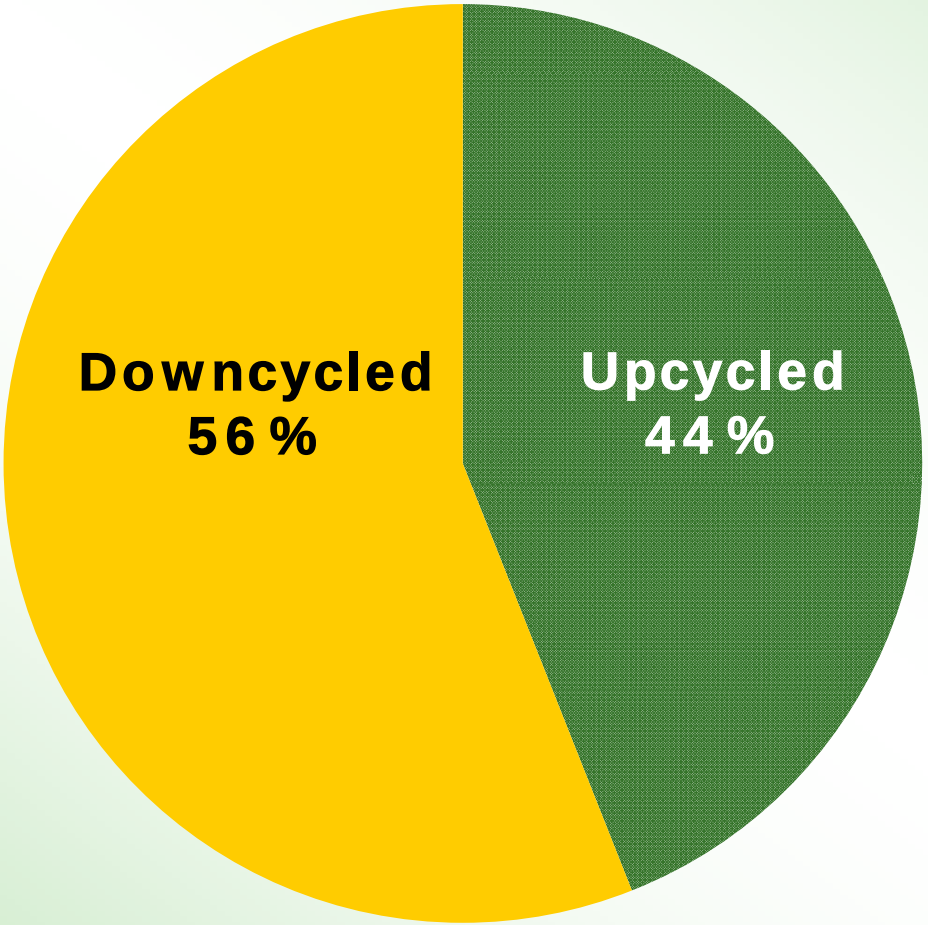
kessler consulting inc.
innovatice waste solutions

Vegetative Debris Beneficial Use Markets



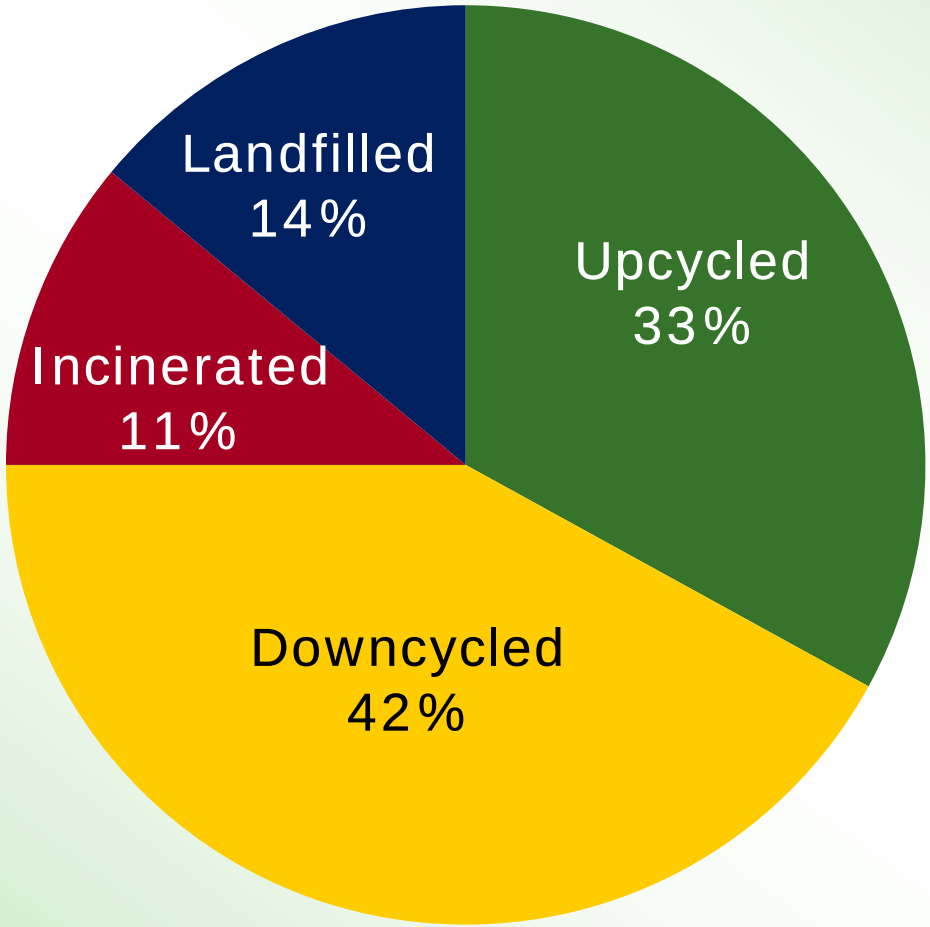
kessler consulting inc.
innovatice waste solutions

Disposition of Materials Beneficially Used



kessler consulting inc.
innovatice waste solutions

Vegetative Storm Debris Management Methods



kessler consulting inc.
innovatice waste solutions

Challenges

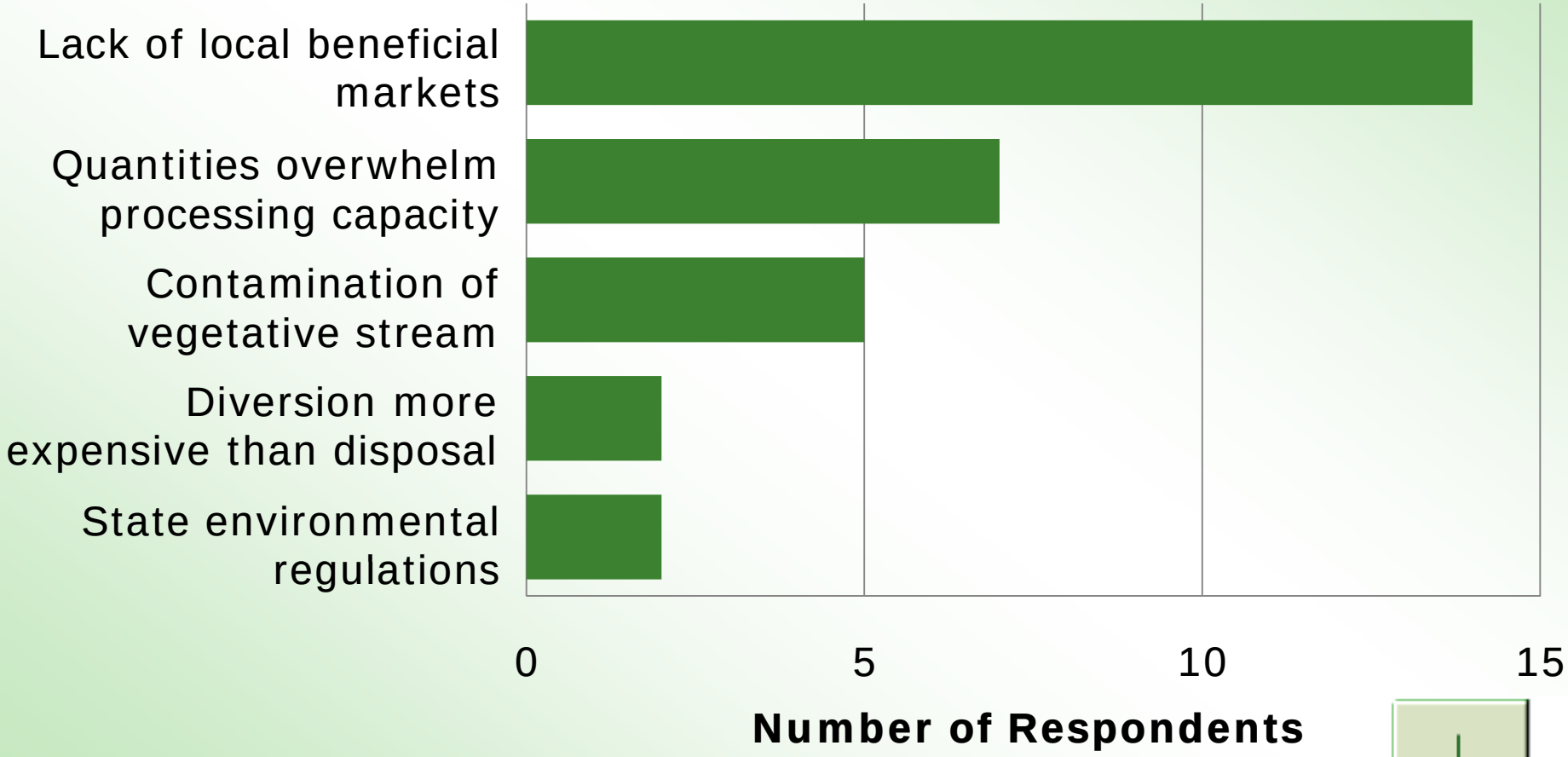
"During and after a major storm event, the overriding concern is picking up the debris and getting rid of it as quickly and cheaply as possible. Any extra costs, time or complications are just going to fail. It is the reality of the situation.

... We do not even have markets or capacity for vegetative mulch and products under normal circumstances."

~ Florida County Official
from storm hit areas in 2004/2005

kessler consulting inc.
innovatice waste solutions

Key Barriers to Increasing Beneficial Use



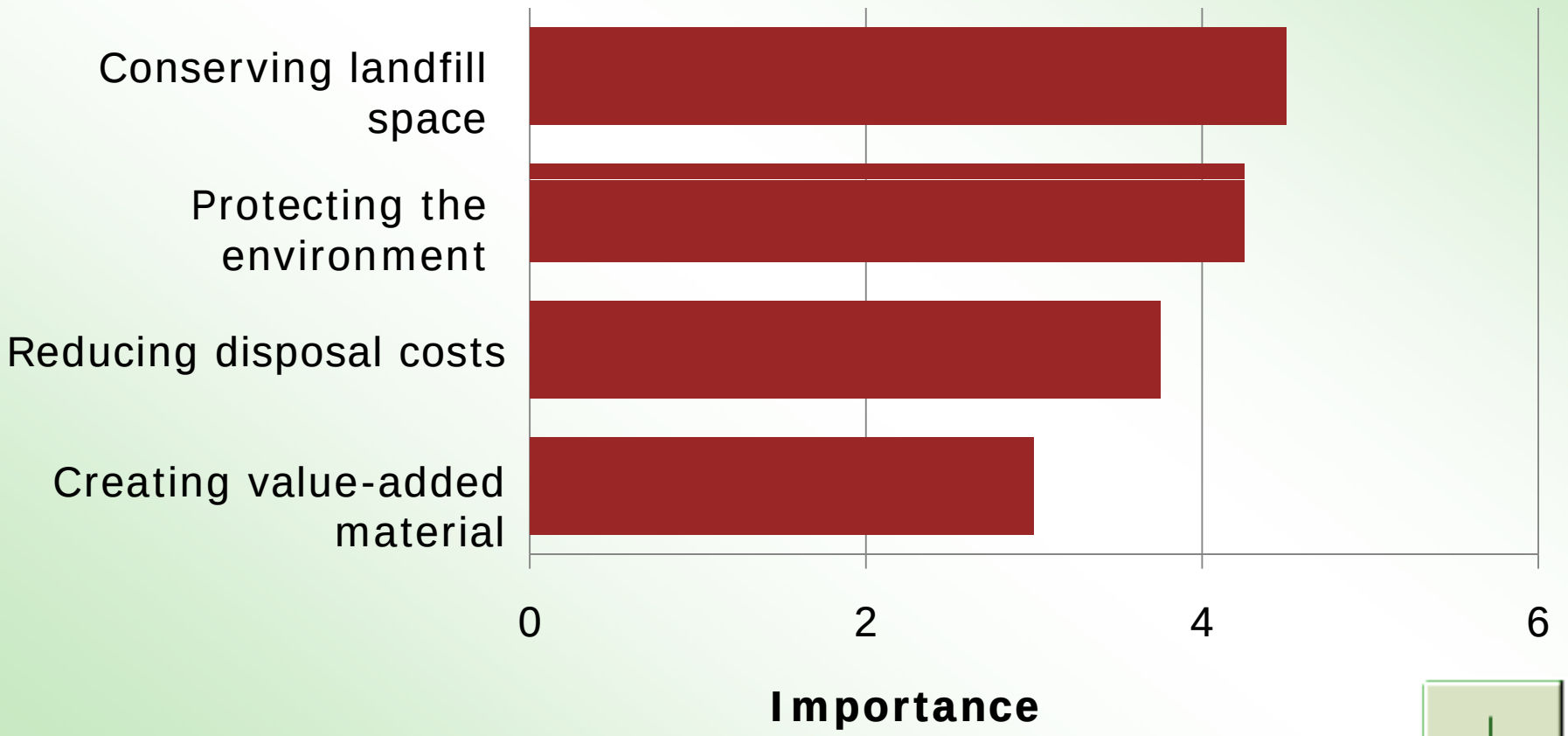
kessler consulting inc.
innovatice waste solutions

Additional Impediments to Beneficial Use

- High transportation costs required to access distant markets
- Inadequate pre-planning to identify and secure end-markets
- Lack of control and oversight over management of final debris disposition by contractors

kessler consulting inc.
innovatice waste solutions

Most Important Benefits of Diversion



kessler consulting inc.
innovatice waste solutions

Resources & Assistance to Increase Beneficial Use

- Expanded and localized beneficial-use markets for vegetative debris
- Online database of available beneficial-use markets for disaster debris, including:
  - quality & quantity requirements
  - costs & revenues
  - location & contact information
- Model contract language to provide financial incentives to vendors for increasing volume of beneficially used and recovered debris

kessler consulting inc.
innovatice waste solutions

Key Elements of Debris Management Contracts

- Contractors required to maximize recycling and beneficial use of debris
- Only debris waste stream accepted for landfilling is putrescible waste & residue from debris reduction/recycling operations
- County holds right to approve or deny final disposal methods and disposal sites utilized by debris contractors
- To the maximum extent possible, contractors use recycled wood chips from vegetative debris for agricultural purposes

kessler consulting inc.
innovatice waste solutions

Debris Collection

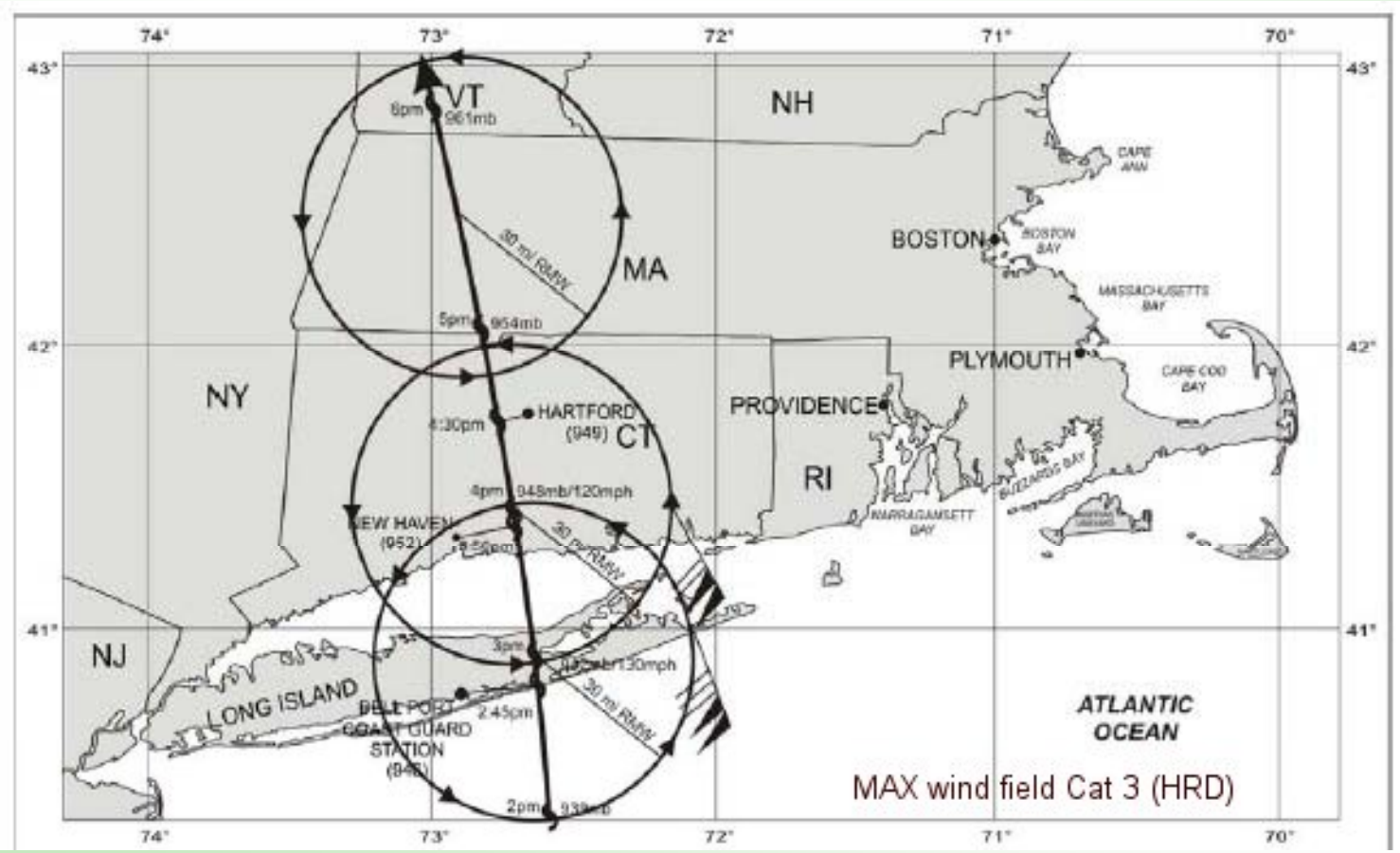
Note: Please Do Not Do This!
Please place bulk debris at the curb
in a pile separate from vegetative debris

Source: Palm Beach County Solid Waste Authority

kessler consulting inc.
innovatice waste solutions

It Could Happen Here

Path of Great New England Hurricane of 1938



kessler consulting inc.
innovative waste solutions

Impacts of 1938 Hurricane

- Killed 700 people
- Damaged or destroyed over 57,000 homes
- Caused $6 billion in property losses
- If it happened tomorrow- $30 billion in damages

kessler consulting inc.
innovatice waste solutions

2 Billion Trees Downed

"The ground around our house had become so soggy from the rain that nearly all our tall trees had been uprooted."

kessler consulting inc.
innovatice waste solutions

2006 Mothers Day Flood

Typical Flood Debris

- White Goods - furnaces, air conditioners, stoves, hot water heaters, washers/dryers, refrigerators
- Electronics - computers, stereos, televisions, gaming systems, video equipment
- Household Hazardous Waste - paint, solvents, cleaners, petroleum products
- Furniture - beds, chairs, sofas, tables.
- Wall Coverings and Flooring – sheet rock paneling, carpeting, area rugs, vinyl/linoleum floring.
- Motorized Equipment - lawn mowers, gas trimmers, chain saws, power tools

kessler consulting inc.
innovatice waste solutions

Typical Segregation Streams for Flood Debris

- C&D debris/furniture
- Yard waste and tree debris
- Household hazardous waste
- Appliances/White Goods/Other Metals
- Electronics

kessler consulting inc.
innovatice waste solutions

Challenges to Beneficial Use of Flood Debris

- Contamination from sewage and hazardous materials
- Diverse and multi-material debris stream
- Localized nature of flash floods means small amount of debris, increasing per ton management costs

kessler consulting inc.
innovatice waste solutions

Opportunities to Beneficial Use of Flood Debris

- Some materials easily segregated and recycled, e.g., steel, white goods, clean wood, tree debris
- High-cost of NE disposal and energy expands type of materials that can be cost-effectively recovered for beneficial use, e.g., furniture, carpet, electronics, some C&D

kessler consulting inc.
innovatice waste solutions

Workshop: Maximizing Beneficial Use of Disaster Debris

Monday, October 20th 2008

www.Wastecon.SWANA.org

kessler consulting inc.
innovatice waste solutions

Contact Information

Michael Alexander

Kessler Consulting, Inc.

Northeast Office

(802) 254-3338

malexander@kesconsult.com

www.kesconsult.com

kessler consulting inc.
innovatice waste solutions