ABS Consulting

Florida Power & Light

Storm Loss and Reserve Performance Analysis

February 2009

FPL®

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Risk Profile

The following is a summary description of storm risk profile performed for Florida Power & Light (FPL) by ABS Consulting. This document is based on FPL data and is intended to be used solely, by FPL, for estimation of potential future storm losses and probabilities.

INSURED	**Florida Power & Light**	
ASSETS	Transmission and Distribution (T&D) System consisting of: Transmission towers, and conductors; Distribution poles, transformers, conductors, lighting and other miscellaneous assets. General property and NEIL insured property.	
LOCATION	All T&D assets located within State of Florida	
ASSET VALUE	Normal T&D replacement value is estimated to be approximately $20.2 billion, of which approximately 18% is transmission and 82% is distribution.	
LOSS PERILS	Hurricanes, Category 1 to 5, and Tropical Storms losses to T&D. Deductible losses to insured general property and NEIL insured property from hurricanes.	
EXPECTED ANNUAL LOSS	$153.3 million	
5% AGGREGATE DAMAGE EXCEEDANCE VALUE	$683 million	
1% AGGREGATE DAMAGE EXCEEDANCE VALUE	$2,028 million	
	Reserve Performance	
Reserve Analysis Cases $215 m initial balance	**Expected balance at 5 years**	**Probability of negative balance within 5 years**
$100 million Annual Accrual	($117 million)	42%
$150 million Annual Accrual	$138 million	33%
$175 million Annual Accrual	$266 million	30%

1. Storm Loss Analysis

FPL's T&D systems and other property assets are exposed to and in the past have sustained damage from storms. The exposure of these assets to storm damage is described and potential losses are quantified in this report. Loss analyses were performed by ABS Consulting, using a computer model simulation program USWIND ™developed by EQECAT, an ABS Group Company. All results which are presented here have been calculated using USWIND, and the asset portfolio data provided by FPL.

The hurricane exposure is analyzed from probabilistic approach, which considers the full range of potential storm characteristics and corresponding losses. Probabilistic analyses identify the probability of damage exceeding a specific dollar amount. Damage to T&D assets is defined as the cost associated with repair and/or replacement of T&D assets necessary to promptly restore service in a post hurricane environment. This cost is typically larger than the costs associated with scheduled repair and replacement.

Probabilistic Annual Damage & Loss is computed using the results of over 100,000 random variable storms. Annual damage and loss estimates are developed for each individual site and aggregated to overall portfolio damage and loss amounts. Damage is defined as the cost associated with repair and/or replacement of T&D assets necessary to promptly restore service in a post-storm environment. This cost is typically larger than the costs associated with scheduled repair and replacement programs.

Factors considered in the analyses of the T&D assets include the location of FPL's overhead and underground T&D assets, the probability of storms of different intensities and/or landfall points impacting those assets, the vulnerability of those assets to storm damage, and the costs to repair assets and restore electrical service.

FPL's non-T&D assets consist of fossil and nuclear power plants, buildings, substations and other miscellaneous assets and are also exposed to storm perils. These assets are covered by insurance policies with deductible retentions. The deductible exposures for these portfolios of assets were modeled to determine their loss expectancies and impacts on the reserve. Other non-recovered cost from storm staging were also modeled.

Loss Estimation Methodology

The basic components of the hurricane risk analysis include:

- **Assets at risk:** define and locate
- **Storm hazard**: apply probabilistic storm model for the region
- **Asset vulnerabilities:** severity (wind speed) versus damage
- **Portfolio Analysis:** probabilistic analysis - damage/loss

These analysis components are summarized herein.

2. Assets at Risk

2.1 Transmission and Distribution Assets

FPL's T&D System assets consist of:

- Transmission towers, and conductors,
- Distribution poles, transformers,
- Conductors, lighting and
- Other miscellaneous assets.

The total normal replacement value of these assets is approximately $20.2 billion, 18% of which is transmission and 82% distribution. Normal replacement value is the cost of replacing the assets under normal non-catastrophe conditions.

FPL's T&D assets are distributed unevenly across their Florida service territory, encompassing a large portion of the State. These assets are geo-located located in the USWIND™ Storm model by latitude and longitude to capture the spatial distribution and concentration of these assets at risk.

Table 2-1 shows the distribution values within Florida for the counties that make up 92% of the total, indicating a concentration of values in the southern portion of the state. Figure 2-1 shows a map of FPL's transmission structures while Figure 2-2 shows a map of the distribution values indicating a similar concentration of values in south Florida Counties.

2.2 Non-Transmission and Distribution Assets

FPL's non-T&D assets consist of fossil and nuclear power plants, buildings, substations and other miscellaneous assets. The total replacement value of these assets is approximately $30 billion.

The FPL general and nuclear plant asset (non-T&D) portfolio is insured for storm losses under two insurance policies, with two per-occurrence deductibles. The deductible amounts represent self-insured retentions by FPL and are modeled as exposures to the reserve. Nuclear Electric Insurance Ltd. (NEIL) provides power plant property insurance for Turkey Point Units 1 through 4 and St. Lucie Units 1 and 2. The policy has a deductible of $10 million per occurrence/per site with coinsurance of 10% of the claim above that deductible. The balance of FPL's general plant assets, buildings, fossil power plants and substations are insured and have an aggregate per-occurrence deductible of $25 million.

Table 2-3 below, shows the replacement values and the distribution of values between transmission, distribution, general plant, and nuclear plant assets.

Table 2-1-
Distribution Replacement Values by County, Largest Counties

DISTRIBUTION COUNTY	2008 Asset Value
Dade	$4,304,369,834
Palm Beach	$3,061,099,330
Broward	$2,610,321,143
Brevard	$911,659,656
Lee	$721,100,921
Sarasota	$693,055,167
Volusia	$584,870,148
St Lucie	$518,890,514
Collier	$449,725,596
Manatee	$433,038,006
Martin	$364,605,705
Charlotte	$337,414,463
St Johns	$233,098,294
Other Counties	$1,270,606,032
TOTALS	**$16,493,854,808**

Table 2-2

Transmission Asset Replacement Value

TRANSMISSION	2008 Asset Value
TOTALS	$3,658,138,339

Table 2-3

FPL Asset Replacement Values

	$(Thousands)	%
Distribution	$ 16,493,854	33%
Transmission	$ 3,658,138	7%
General Plant	$20,138,897	40%
Nuclear Power Plants	$ 9,840,000	20%
TOTAL	$50,130,890	100%

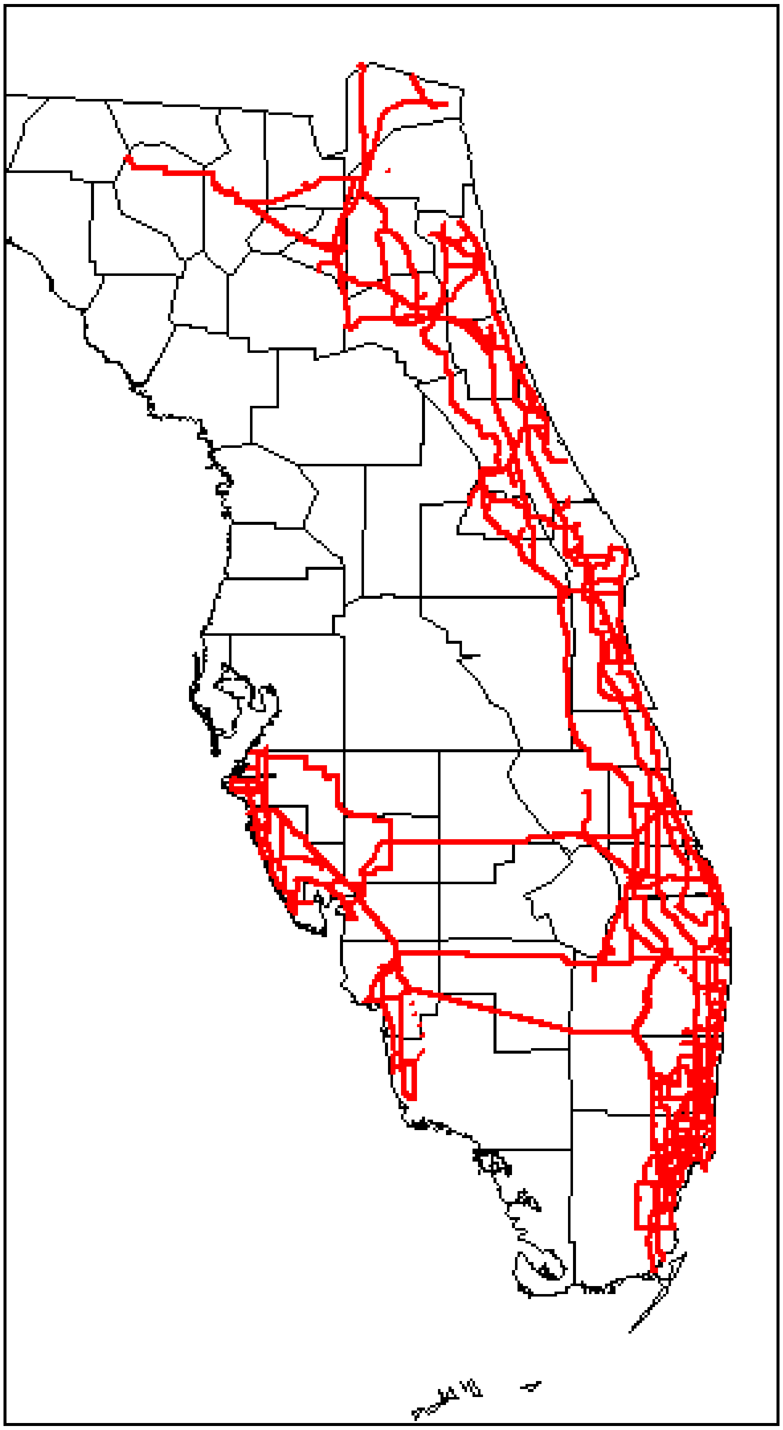

Figure 2-1: FPL Transmission Structures

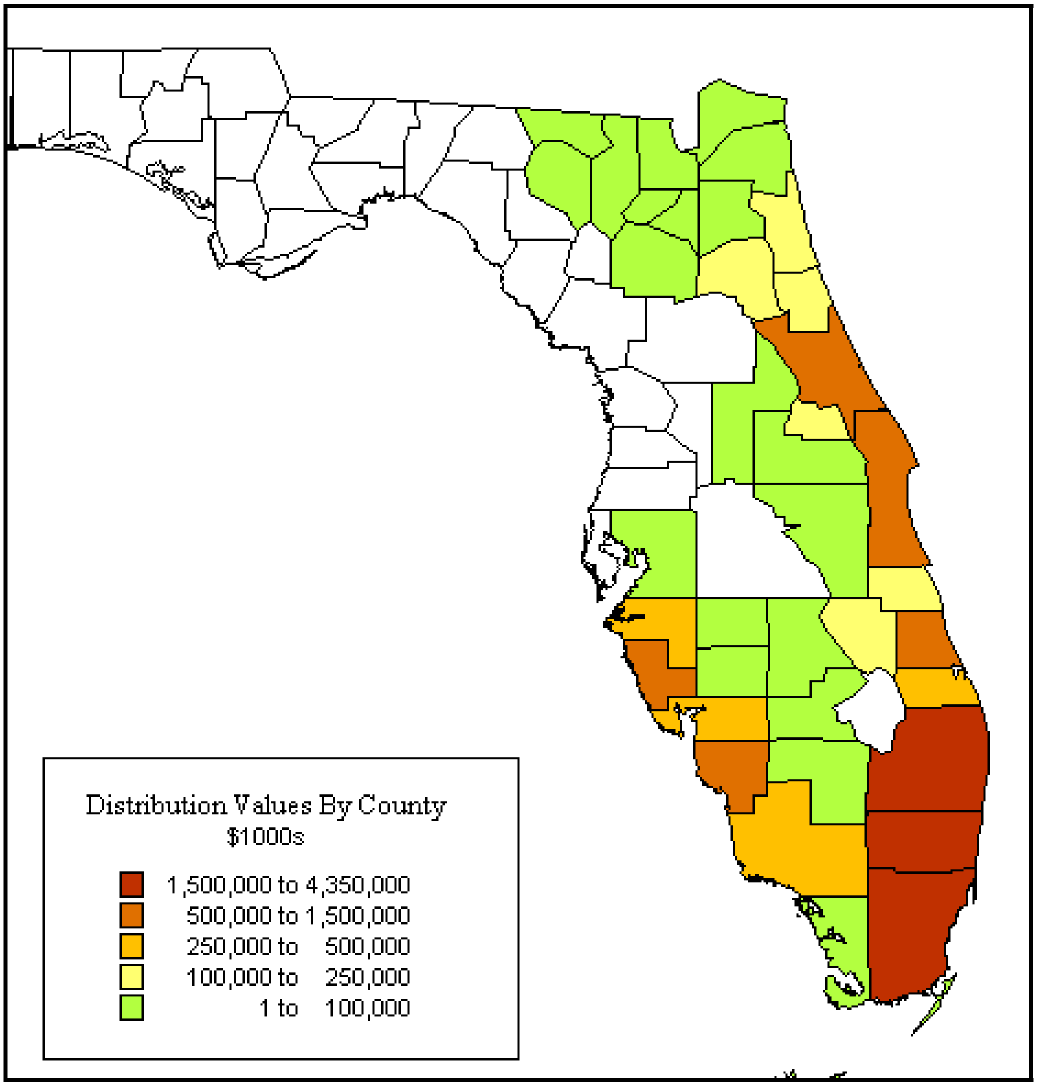

Figure 2-2: FPL Overhead Distribution Values

3. Windstorm Hazard in Florida

The historical record for hurricanes on the Gulf and Atlantic coasts of the United States consists of approximately 100 years for which reasonably accurate information is available. For example, since 1900, there have been over 60 hurricanes of Saffir-Simpson Intensity (SSI) 1 or greater (see Table 3-1 for description of the Saffir-Simpson Intensity scale) which have made landfall in the state of Florida. Going back further, written descriptions of storms are available, but it becomes increasingly difficult to estimate actual storm intensities and track locations in a reliable manner consistent with the later data. For this reason all hypothetical storms used in this analysis, as well as their corresponding frequencies, have been based only on hurricanes that have occurred since 1900.

Since the historical record is too sparse to simply extrapolate future hurricane landfall probabilities, a series of hypothetical storms was generated in the USWIND™ probabilistic storm data base, essentially “filling in” the gaps in the historical data. This provides an estimate of future potential storm locations (landfall), track, severity and frequency consistent with the observed historical data.

EQECAT developed its hurricane model (Reference 1), using the National Oceanic and Atmospheric Administration (NOAA) model as the base, to determine individual risk wind speeds. The NOAA model was designed to model only a few specific types of storms. While the eye of the hurricane follows the selected track, the EQECAT model uses up to a dozen different storm parameters to estimate wind speeds at all distances away from the eye. The version of USWIND currently certified by the Florida Commission on Hurricane Loss Projection Methodology (FCHLPM) is based in part on the FCHLPM’s Official Storm Set, which includes hurricanes affecting Florida during the period 1900 through 2007.

The hurricane intensities used for the analyses conform to basic NOAA information regarding hurricane intensity recurrence relationships corresponding to locations along the coast. Much of FPL’s service territory includes the coastal area where many of these hurricanes have made landfall.

Table 3-1

THE SAFFIR-SIMPSON INTENSITY SCALE
(NOTE THAT WINDSPEEDS GIVEN ARE 1-MINUTE SUSTAINED)

SSI	Central Pressure (mb)	Maximum Sustained Winds (mph)	Storm-Surge Height (ft)	Damage
1	≥ 980	74-95	4-5	Damage mainly to trees, shrubbery, and unanchored mobile homes
2	965-979	96-110	6-8	Some trees blown down; major damage to exposed mobile homes; some damage to roofs of buildings
3	945-964	111-130	9-12	Foliage removed from trees; large trees blown down; mobile homes destroyed; some structural damage to small buildings
4	920-944	131-155	13-18	All signs blown down; extensive damage to roofs, windows, and doors; complete destruction of mobile homes; flooding inland as far as 6 mi.; major damage to lower floors of structures near shore
5	< 920	> 155	> 18	Severe damage to windows and doors; extensive damage to roofs of homes and industrial buildings; small buildings overturned and blown away; major damage to lower floors of all structures less than 15 ft. above sea level within 500m of shore

3.2 Tropical Storm Hazard

In addition to storms strong enough to be classified as hurricanes, Florida is exposed to the threat of tropical storms (one-minute sustained wind speeds between 39 and 74 mph). The frequency of tropical storms in Florida is approximately equal to that of hurricanes (note that the wind speed range associated with hurricanes is much wider, i.e. 74 mph to well over 155 mph).

EQECAT's tropical storm model was developed using methods very similar to those used to develop the hurricane model, generating a series of hypothetical storms representing the full range of tropical storms in terms of landfall location and track, severity, and frequency consistent with the observed historical data.

3.3 Winter Storm Hazard

On average, about 15 mid-latitude storms a year bring high winds to Florida, mainly during the winter. Most of these storms have winds only in the 40 to 50 mph gust range and thus have little effect. The more severe events, however, can cause losses on the same scale as a tropical storm or weak hurricane.

In assessing this hazard, historical windstorm data for the past 45 years was obtained from the National Climatic Data Center. This data included gust wind speed observations for over 600 storms, at a network of over 300 stations.

4. Asset Vulnerabilities

Aerial T&D lines and structures have suffered damage in past hurricanes, tropical storms and winter storms. Damage patterns tend to be most severe in coastal areas. Damage to inland aerial lifelines tends to be less severe with greater contributions to damage from wind-borne debris. The types of wind-borne debris can include tree and tree limbs, and roofing materials as well as structure debris at higher wind speeds.

FPL aerial T&D structures are designed to sustain design-level hurricane winds. These design criteria specify design wind speeds for both T&D structures. Design criteria for transmission structures are microzoned, or segmented, into geographic areas that correspond to the expected wind hazard for the area. Distribution poles, on the other hand, are assumed to have one design standard for the entire service territory.

Vulnerability of T&D assets are based upon wind speeds and FPL provided storm cost data from hurricanes since 1992. Storm cost data has included consideration for Florida Public Service Commission Rule 25-6.0143 – Use of Accumulated Provision Accounts 228.1, 228.2 and 228.4 for historical storms from the 2004 through 2008 hurricane seasons. Other vulnerabilities were developed using FPL-provided data on hurricane, tropical storm, and winter storm damage data, FPL design standards, and engineering judgments of the relative performance of the structures and material types.

Vulnerabilities of non-T&D assets are modeled using standard classes of commercial buildings and specialized utility infrastructure vulnerabilities in USWIND.

5. Summary of Portfolio Analysis

ABS analyzed the FPL portfolio of T&D assets and other non-T&D assets subject to a suite of probabilistic storms using the proprietary computer program, USWIND. The probabilistic storm analyses provide non-exceedance probabilities over a range of loss levels while the scenario landfall storm series provides a damage distribution for selected storms at landfalls within the areas of FPL's highest asset concentrations.

5.1 Storm Probabilistic Analysis

The probabilistic loss analysis is performed using USWIND. The hurricane hazard uses the USWIND probabilistic database which models the coastline in 10 mile segments and models more than 1,500 hypothetical storms for each segment. The net result is a stochastic storm database of more than 500,000 events that represents possible hurricanes affecting the eastern United States, along both the Gulf and the Atlantic coasts. Each hurricane in the database has been defined by associating a central pressure with a unique storm track. In addition, each hurricane is assigned an annual frequency of occurrence, which depends on the storm track location and the storm intensity as measured by central pressure.

Tropical storms are modeled using a set of approximately 250,000 and additional events, representing the full range of potential storms affecting the Gulf and Atlantic coasts of the United States. As in the stochastic hurricane database, each tropical storm in the database has been defined by associating a central pressure with a unique storm track. In addition, each tropical storm is assigned an annual frequency of occurrence, which depends on the storm track location and the storm intensity as measured by central pressure. Loss expectancies from winter storms are based on the results from prior analyses adjusted for current asset valuation of distribution assets at risk. This exposure is included in estimates of the Expected Annual Losses below, but have not been included in the reserve performance analysis due to the small value.

For each location in the portfolio, the wind speed is calculated, and based on the type of asset, the degree of damage is estimated. The result for each asset location is an estimate of the mean damage.

5.2 Other Reserve Exposures

In addition to T&D storm losses and non-T&D deductible exposures discussed above, FPL's reserve may be called upon for payment of uninsured losses resulting from other causes. These include

- Storm staging costs
- Retrospective insurance assessment from industry nuclear accidents and
- Losses in excess of insurance coverage from nuclear accidents at FPL plants.

Staging Costs for Non-Landfalling Storms

FPL monitors hurricane forecasts and arranges for the pre-positioning of personnel and equipment, "staging", in anticipation of post hurricane storm restoration activities. These decisions are made in advance of hurricane landfall. On occasion, these staging decisions are taken and actual hurricane landfall occurs outside FPL's service territory. The central issue with staging costs is the probability that hurricane forecasts (where and at what intensity) may differ from actual hurricane landfalls.

A model for staging costs was developed using staging cost and decision information provided by FPL. The input parameters to the model are: forecasted landfall location (milepost), forecasted intensity (wind speed), actual landfall location (milepost), and actual intensity (wind speed). Staging costs are only calculated for situations in which the forecasted landfall is within FPL's service territory, and the actual landfall is not within FPL's service territory. For these situations, the staging costs are determined on the basis of the forecasted landfall location and intensity, based on staging cost information provided by FPL. For all other situations, the staging cost is assumed to be zero. The expected annual loss from staging is estimated to be $3.5 million per year.

Nuclear Exposures

FPL reserve exposures due to property damage and third party liabilities could arise from two sources:

- Nuclear accidents at FPL's four nuclear units located at Turkey Point and at St. Lucie and
- Nuclear accidents at plants in nuclear mutual insurance pools

Reserve obligations could result from these exposures as a result of mutual insurance obligation retrospective assessments ("Retros") or as a result of low probability events and losses in excess of insurance coverage. Potential financial exposures to the reserve were developed using nuclear industry studies that provide the frequency and severity of nuclear accidents. Estimates of the frequency and the expected annual losses from these events are very low in comparison with storm related exposures. These exposures are included in estimates of the Expected Annual Losses below, but have not been included in the performance analysis of reserve due to their small amounts.

Given the annual frequency and the portfolio loss for each asset class and peril, a probabilistic database of losses is developed. Using this database, various loss non-exceedance distributions are generated. The expected annual loss to FPL's reserve from these sources are shown below:

Table 5-1

Expected Annual Losses to Reserve

Expected Annual Losses	$ (Millions)	Comments
T&D Assets - Hurricane Peril and Tropical Storms	134.7	SSI 1 through 5 Sustained wind speeds of 39-74 Mph
Non T&D General Property Deductibles-Hurricane	9.8	Losses arising from payment of deductibles on insurance policies
NEIL Plant Deductibles - Hurricane	3.9	Losses arising from payment of deductibles on insurance policies
Storm Staging Costs	4.9	FPL Pre-storm mobilization
Distribution Assets - Winter Storms[1]	2	Gust wind speeds of 40-50 Mph
Retrospective Assessments from industry nuclear accidents [1]	1	Property and third-party liability assessments from mutual insurers
Losses in excess of insurance from FPL nuclear accidents [1]	1	Property losses to FPL nuclear plants in excess of insurance
Totals	$157.3	

Note 1: These losses are not included in the reserve performance analysis.

Aggregate Storm Damage Exceedance

Aggregate storm damage exceedance calculations are developed by keeping a running total of damage from ***all possible events*** in a given time period. At the end of each time period, the aggregate damage for all events is then determined by probabilistically summing the damage distribution from each event, taking into account the event frequency. The process considers the probability of having zero events, one event, two events, etc. during the time period.

A series of probabilistic analyses were performed, using the vulnerability curves derived for FPL assets and the computer program USWIND. A summary of the analysis is presented in Table 5-2, which shows the aggregate damage (i.e. deductible is "0") exceedance probability layers between zero and over $2,000 million.

For each damage layer shown, the probability of damage exceeding a specified value is shown. For example, the probability of damage exceeding $1,000 million in one year is 3.0%. The analysis calculates the probability of direct T&D damage, deductible losses and storm staging costs from all storms and aggregates the total, resulting in increasing exceedance probabilities.

Table 5-2

FPL
AGGREGATE DAMAGE EXCEEDANCE PROBABILITIES

Damage Layer ($x1,000)	1 Year Exceedance Probability
> 500	78.2%
100,000	30.5%
200,000	18.0%
300,000	11.8%
400,000	8.59%
500,000	6.90%
600,000	5.60%
700,000	4.67%
800,000	4.04%
900,000	3.44%
1,000,000	3.00%
1,100,000	2.74%
1,200,000	2.44%
1,300,000	2.10%
1,400,000	1.88%
1,500,000	1.69%
1,600,000	1.53%
1,700,000	1.39%
1,800,000	1.28%
1,900,000	1.19%
2,000,000	1.03%

6. Hurricane Landfall Analyses for SSI Ranges

In order to provide further insight into FPL's risk profile, the full set of stochastic hurricane events were analyzed by landfall for five storm intensities, SSI 1 through 5. The storm series landfall locations begin in the areas of highest asset concentration, storm frequency and severity in south Florida. The landfall locations are at mile posts 1430 through 1770. Figure 6-1 illustrates the landfall locations. These mile posts extend north from Dade County at approximately 10 mile intervals.

The full set of stochastic storms within each SSI category was analyzed on FPL's T&D portfolio. For each milepost and SSI category, the frequency-weighted average damage was computed from all stochastic storms making landfall within 10 nautical miles of a given milepost and within that SSI category. Figures 6-2 through 6-6 provide these results graphically.

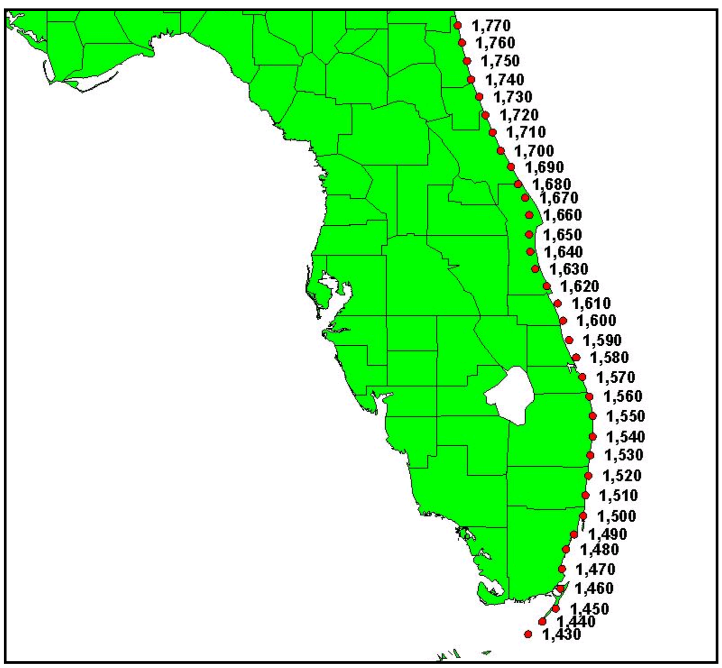

Figure 6-1: Storm Landfall Mile Posts

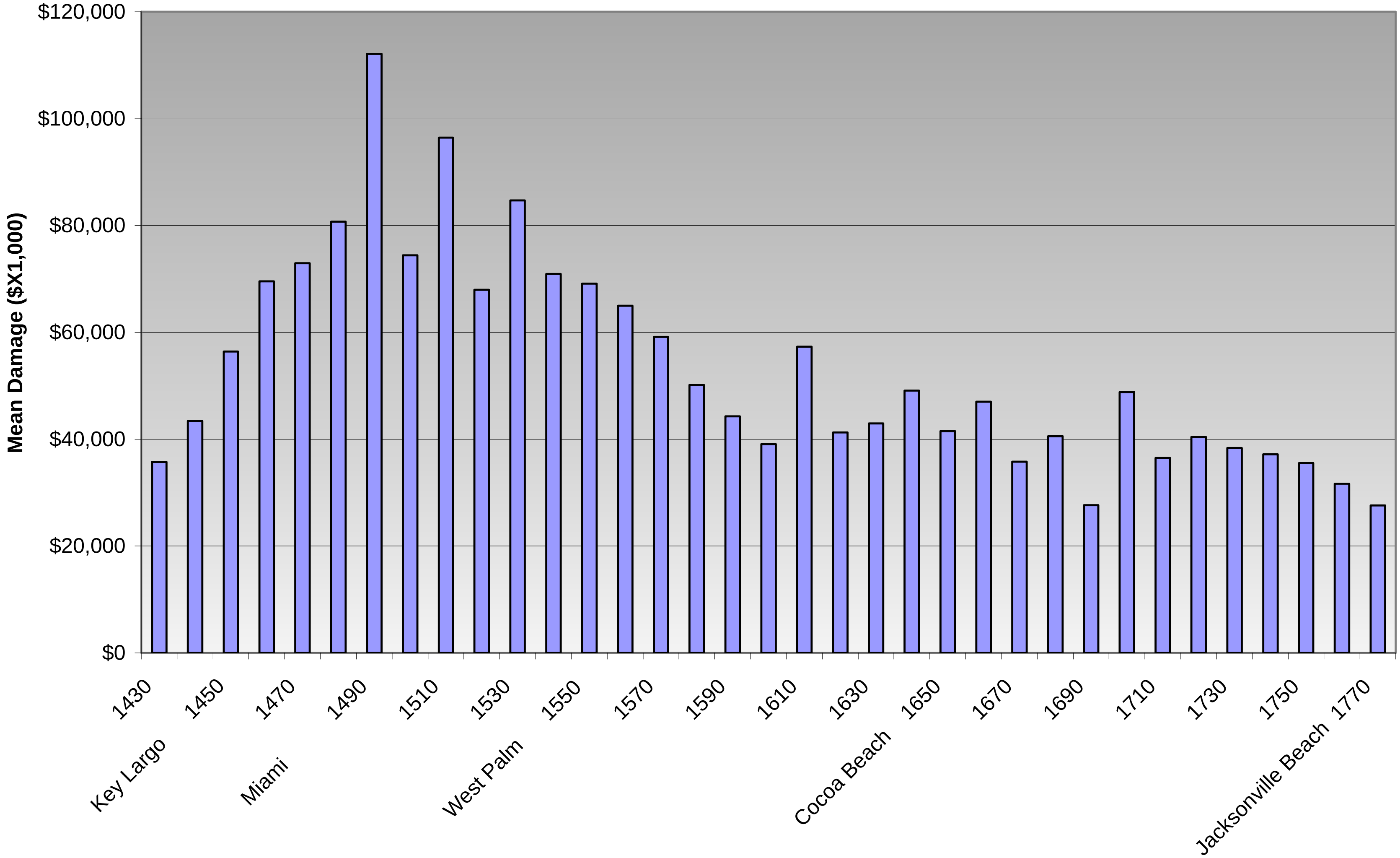

Figure 6-2: Frequency Weighted Average T&D Damage from SSI 1 Landfalls

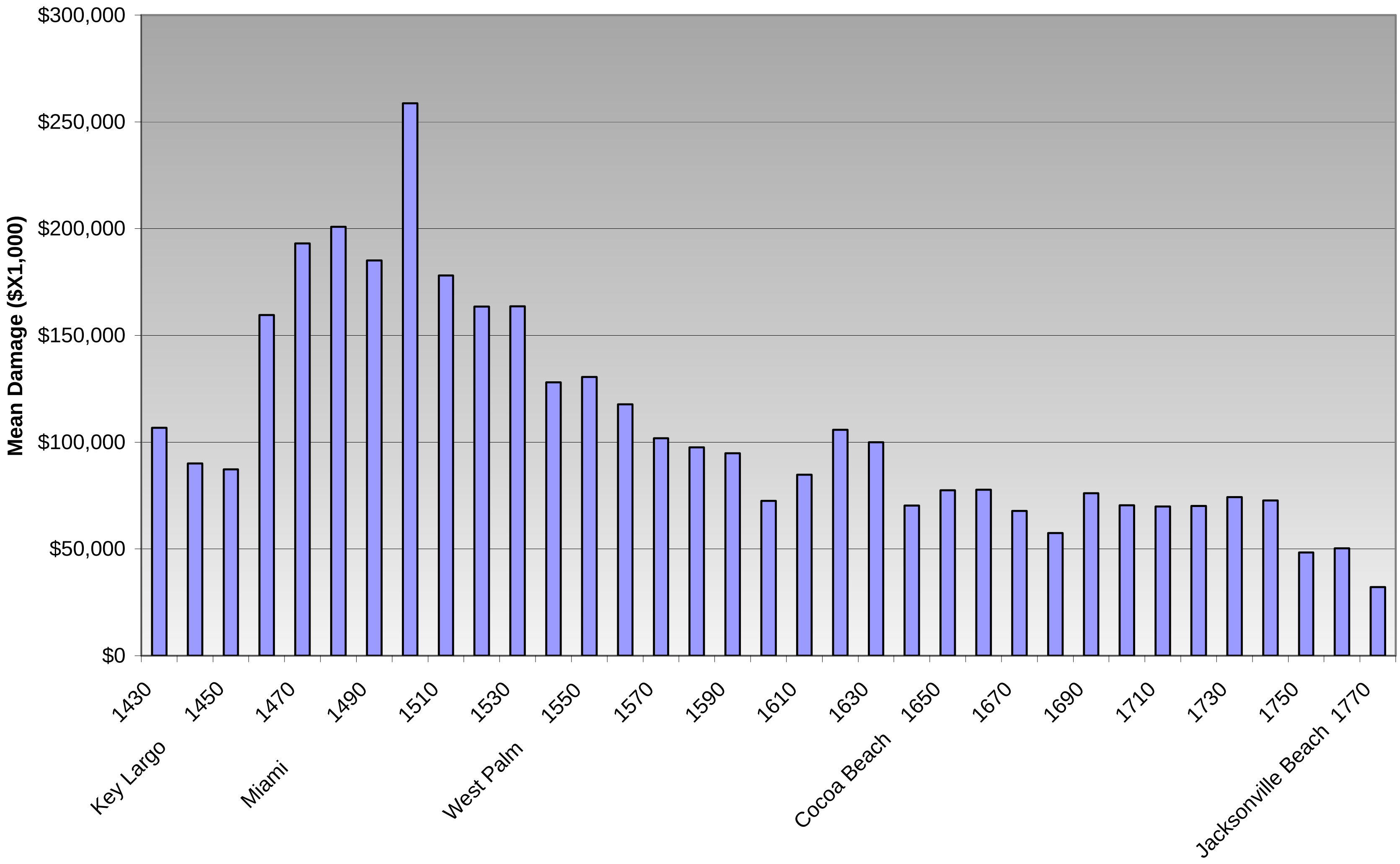

Figure 6-3: Frequency Weighted Average T&D Damage from SSI 2 Landfalls

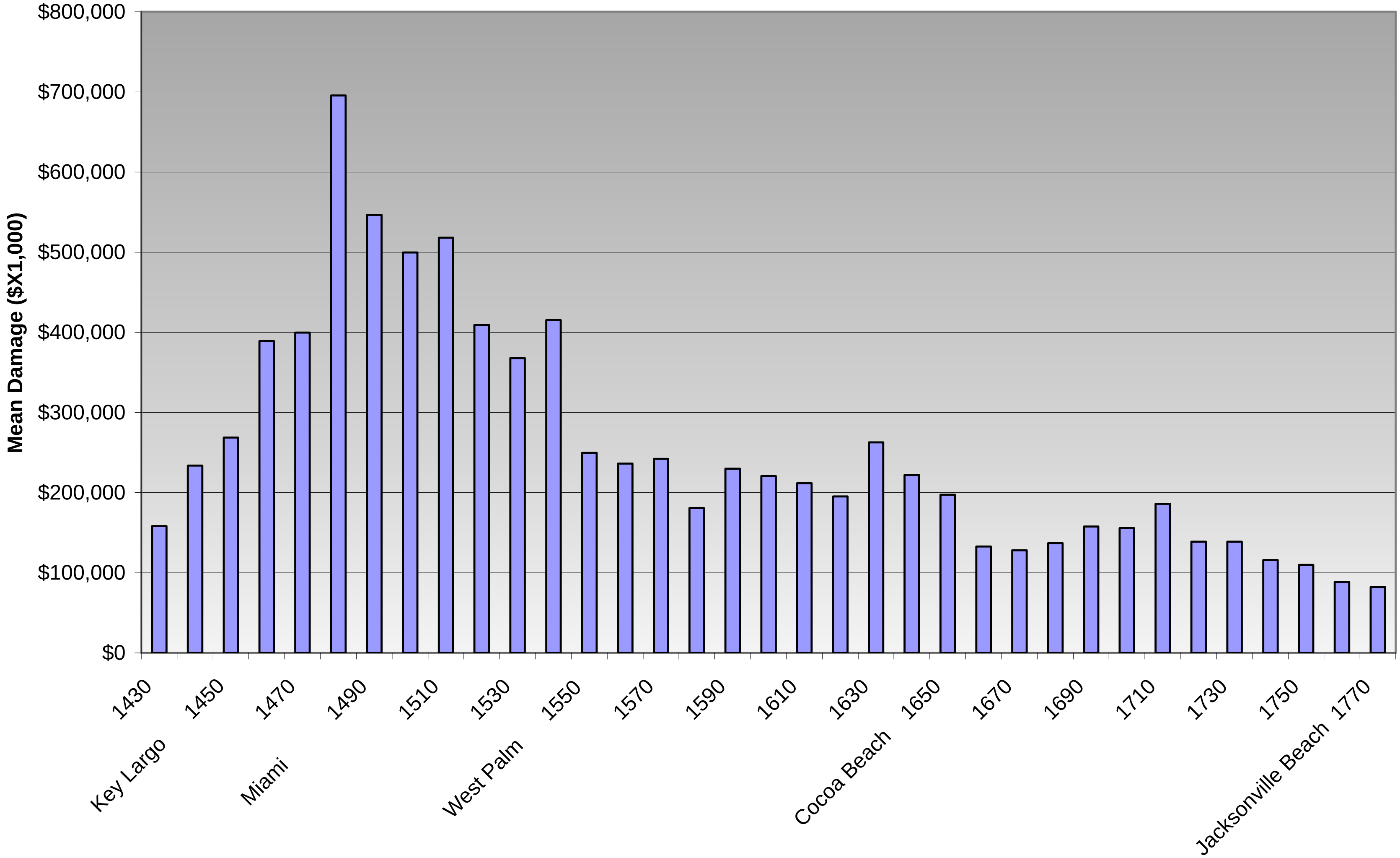

Figure 6-4: Frequency Weighted Average T&D Damage from SSI 3 Landfalls

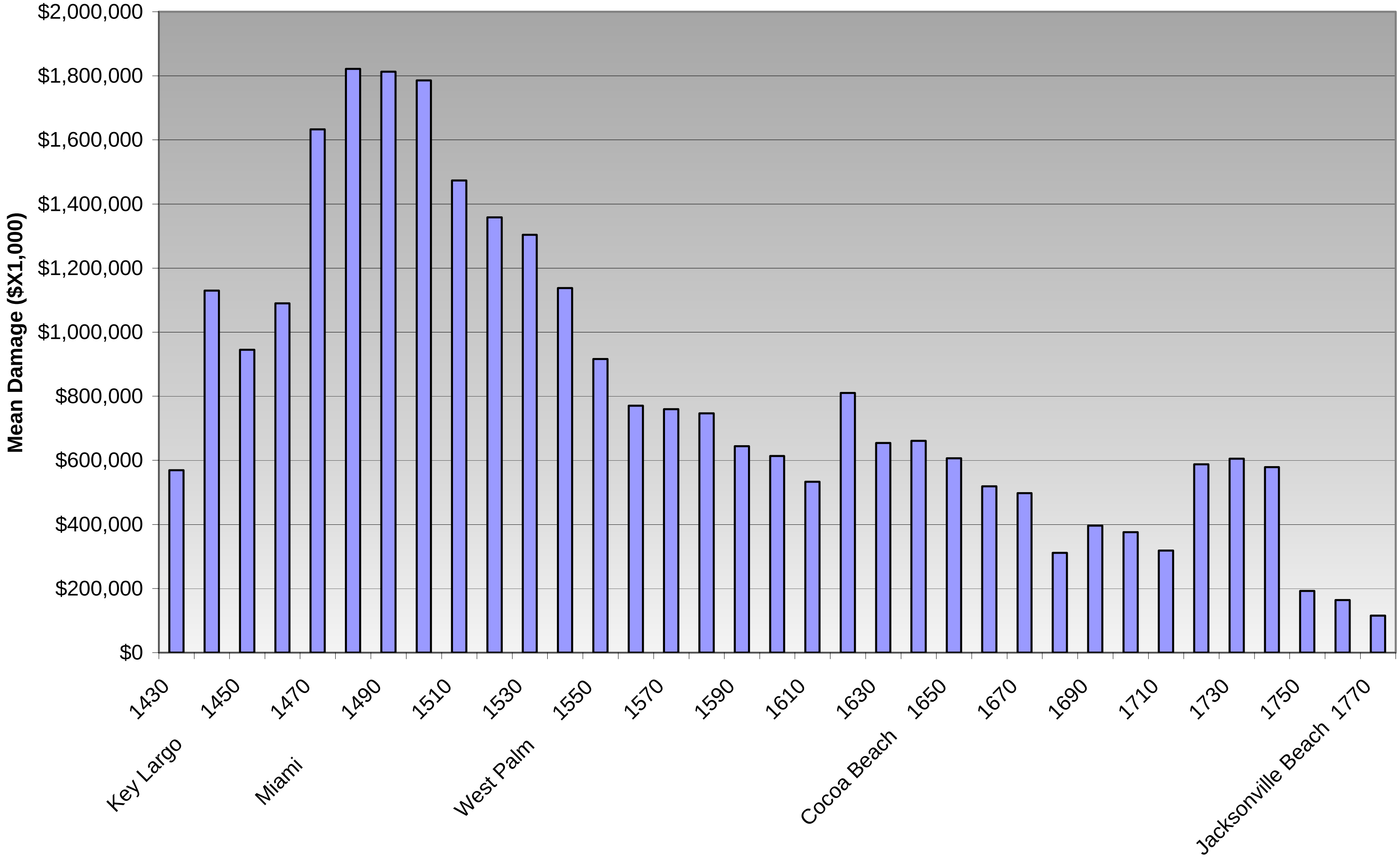

Figure 6-5: Frequency Weighted Average T&D Damage from SSI 4 Landfalls

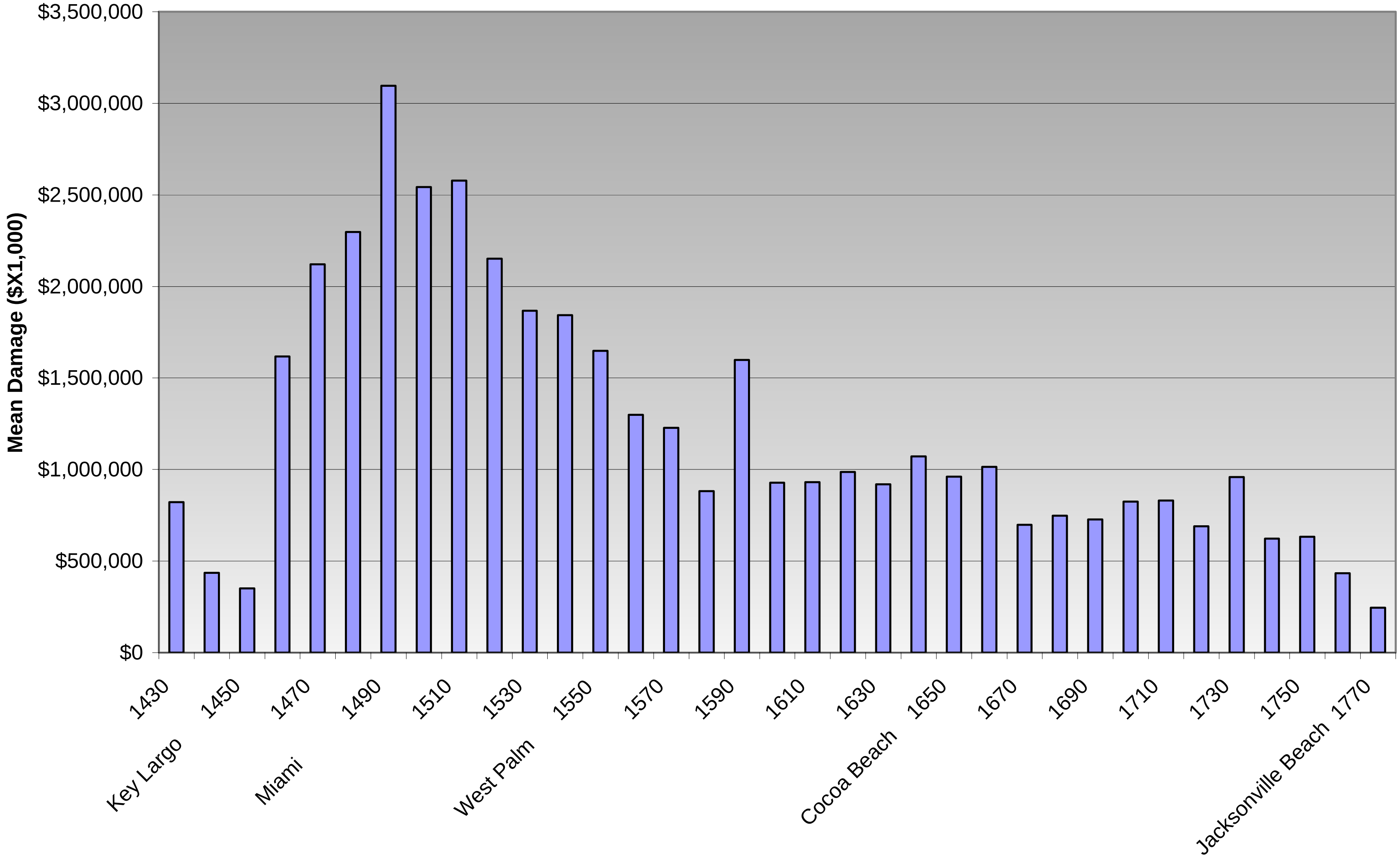

Figure 6-6: Frequency Weighted Average T&D Damage from SSI 5 Landfalls

7. Reserve Performance Analysis

A probabilistic analysis of losses from storms was performed to determine their potential impact on FPL's reserve. The analysis included T&D losses, and insurance deductibles paid on non-T&D assets and storm staging costs. The expected annual loss analyzed in the reserve performance is $153.3 million, as described in the Loss Analysis Section.

The expected annual loss estimate represents the average annual cost associated with repair of hurricane damage and service restoration over a long period of time.

Analysis

The reserve performance analysis consisted of performing 10,000 iterations of hurricane loss simulations within the FPL service territory, each covering a 5-year period, to determine the effect of the charges for losses on the FPL reserve. Monte Carlo simulations were used to generate loss samples for the analysis. The analysis provides an estimate of the reserve assets in each year of the simulation, accounting for the annual accrual, investment income, expenses, and losses using a financial model.

Assumptions

The analysis performed included the following assumptions

- All computations were performed on an after tax basis.
- All results are shown in constant 2008 dollars.
- Asset values and storm losses were assumed to increase by 5% per year.

- Investment earnings were assumed to grow at an after tax rate of 3.45%.
- Negative reserve balances are assumed to be financed with an unlimited line of credit costing 4% after tax.

Analysis Results

The annual accrual cases of $100 million, $150 million, $175 million were analyzed with two assumptions for years in a simulation where the reserve balances becomes negative due to storm losses. The first assumes that the negative balances are recovered through a normal rate process, but are not recovered by the reserve. The second assumes that the negative balances are returned to the reserve through special assessments over a two year period. The two cases analyzed are:

1. No reserve fund recovery of negative balances occurs, and
2. Recovery of negative reserve fund balances occurs over two years.

In years when storm losses exceed the reserve fund balance, the fund has a negative balance. In cases where no recovery of these negative balances was assumed, the deficit was covered by borrowing funds (at a rate of 4.5%) and the annual year accruals are the only sources to pay down this debt and restore the fund to positive balances. The second cases analyzed assumes that in any year that the reserve became negative, the deficit is recovered by the reserve with special assessments over the following five-year period.

The analysis results for each of the accrual trials analyzed are shown in Figures 7-1 through 7-6 below. These results show the mean (expected) reserve fund balance as well as the 5th and 95th percentiles. All 10,000 Monte Carlo simulations assume an initial reserve balance of $215 million.

The mean values of these simulation results are shown in Table 7-1. The 95th percentile upper and 5th percentile lower bounds of the cases are shown and noted with their probability of hurricane losses exceeding this fund value. For the case with a $100 million annual accrual and no recoveries of negative balances, the mean reserve balance is negative ($117 million) and has about a 42% probability of losses less than zero in the five year time interval. The reserve has a 7% probability of having a balance greater than $650 million at the end of the five year simulation.

Similarly, for the case $175 million accrual case, the mean reserve balance is $266 million and has about a 30% probability of losses less than zero in the five year time interval. The reserve has a 55% probability of having a balance greater than $650 million at the end of the five year simulation.

Similar results are presented for cases with recoveries of negative balances over a two year period.

Table 8-1
FPL
RESERVE PERFORMANCE ANALYSIS RESULTS

Annual Accrual ($m)	Recovery of Deficits	Mean Reserve Balance ($m)	5th%ile Reserve Balance ($m)	95th%ile Reserve Balance ($m)	Probability Balance<$0	Probability Balance>$650m
$100	No Recovery	($117)	($2,220)	$673	42%	7%
$150	No Recovery	$138	($1,938)	$931	33%	41%
$175	No Recovery	$266	($1,812)	$1,065	30%	55%
$100	2 Year Recovery	$135	($828)	$666	42%	6%
$150	2 Year Recovery	$382	($602)	$930	33%	42%
$175	2 Year Recovery	$475	($602)	$1,063	30%	56%

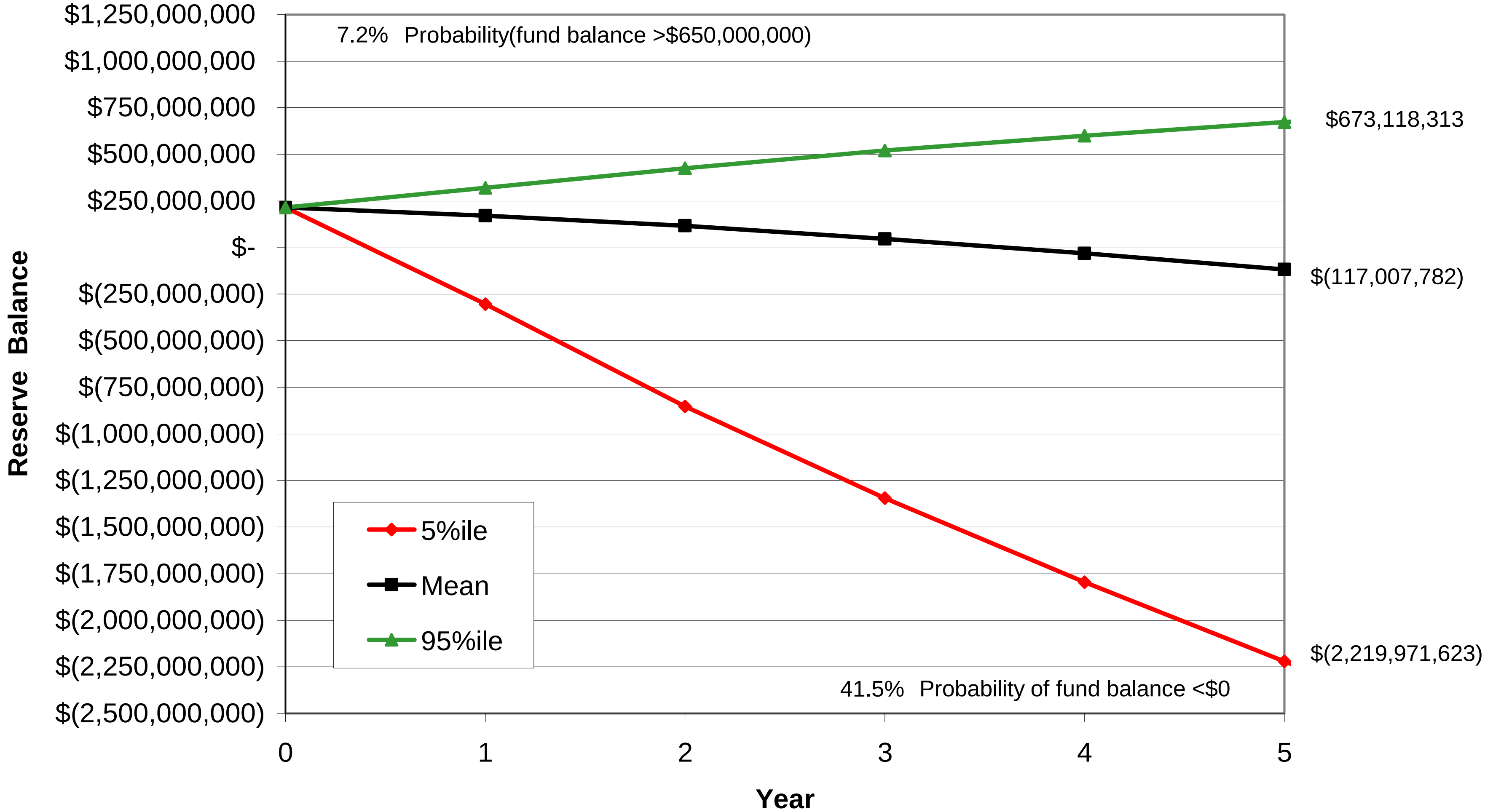

Figure 7-1: Reserve Performance Analyses: $100 million accrual

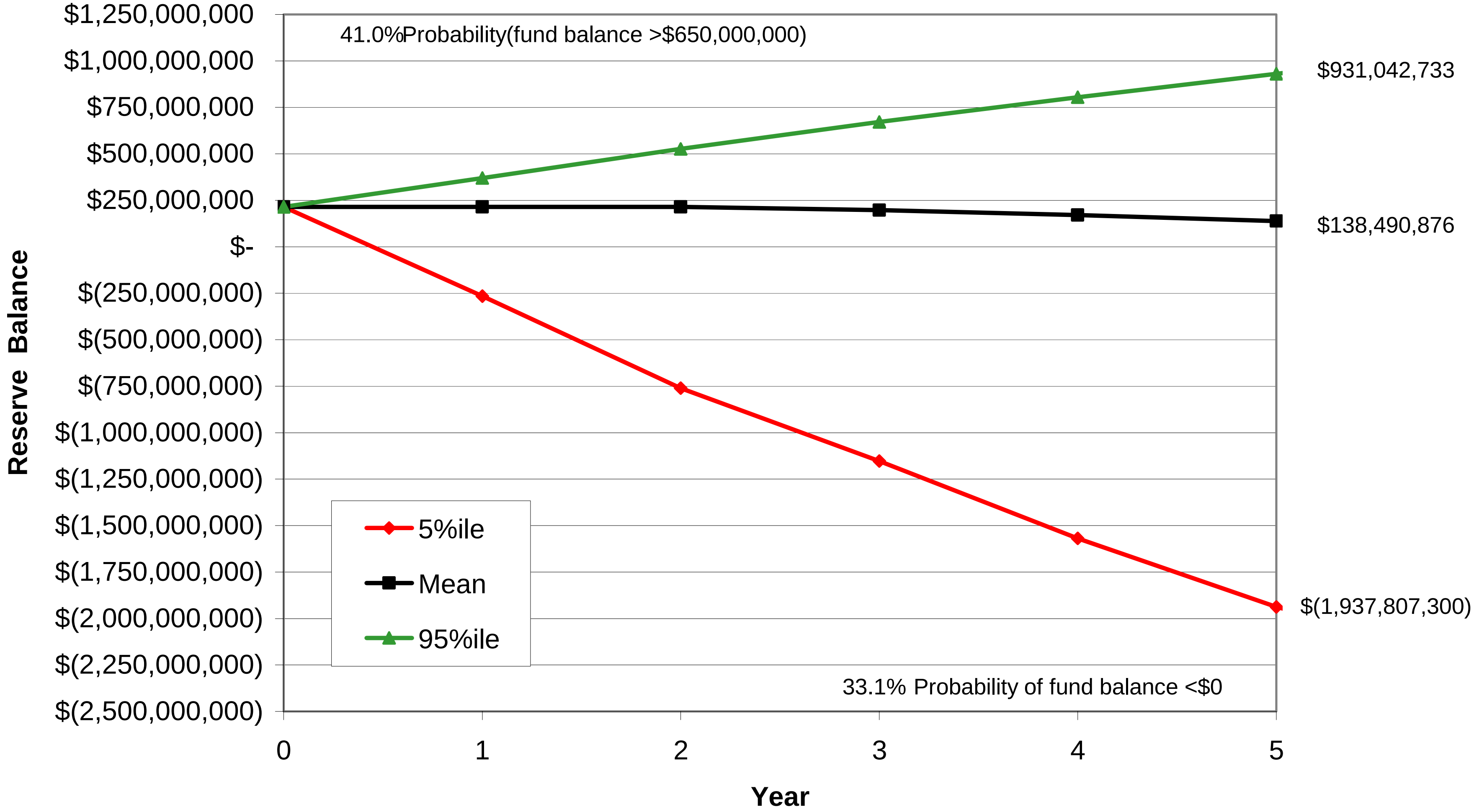

Figure 7-2: Reserve Performance Analyses: $150 million accrual

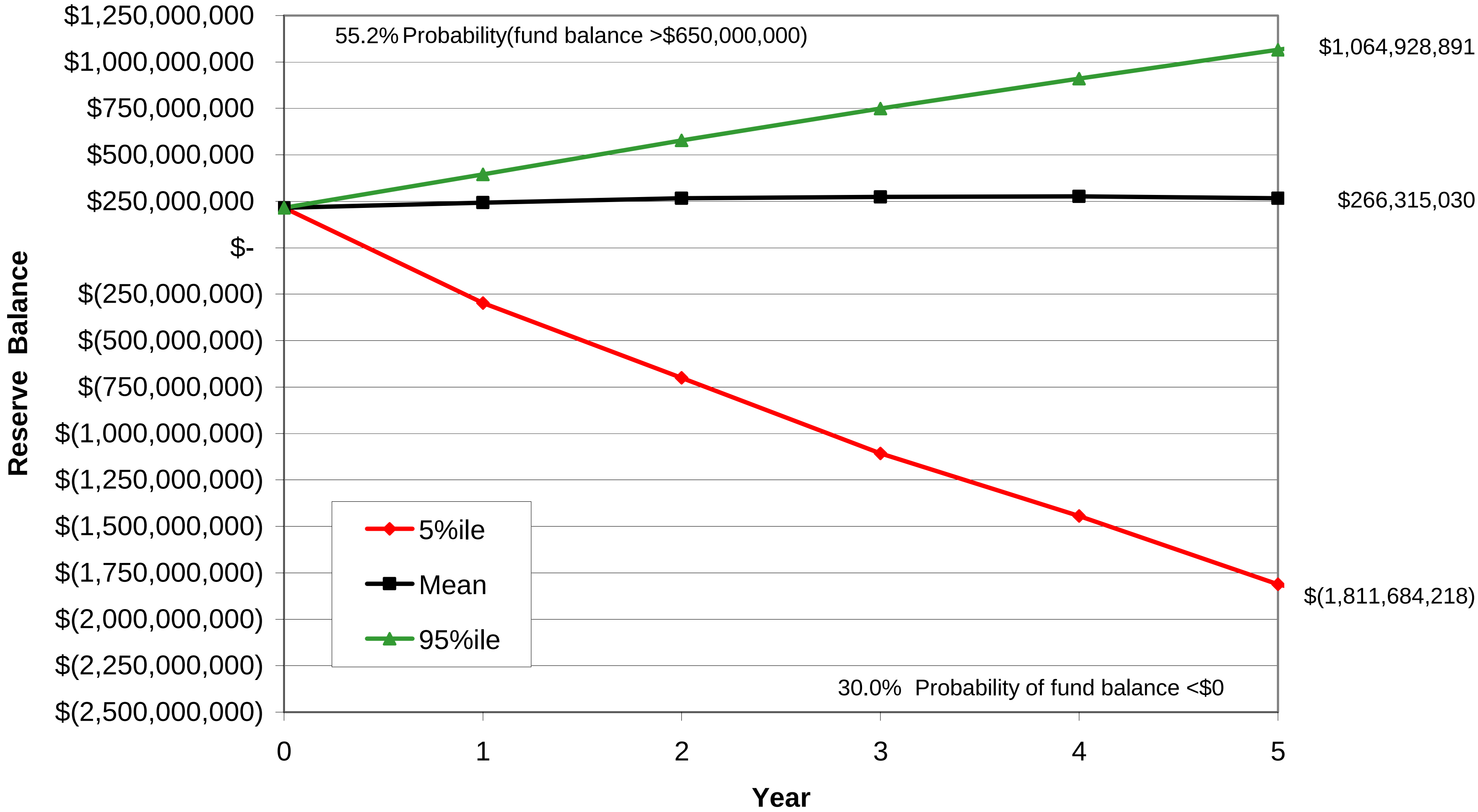

Figure 7-3: Reserve Performance Analyses: $175 million accrual

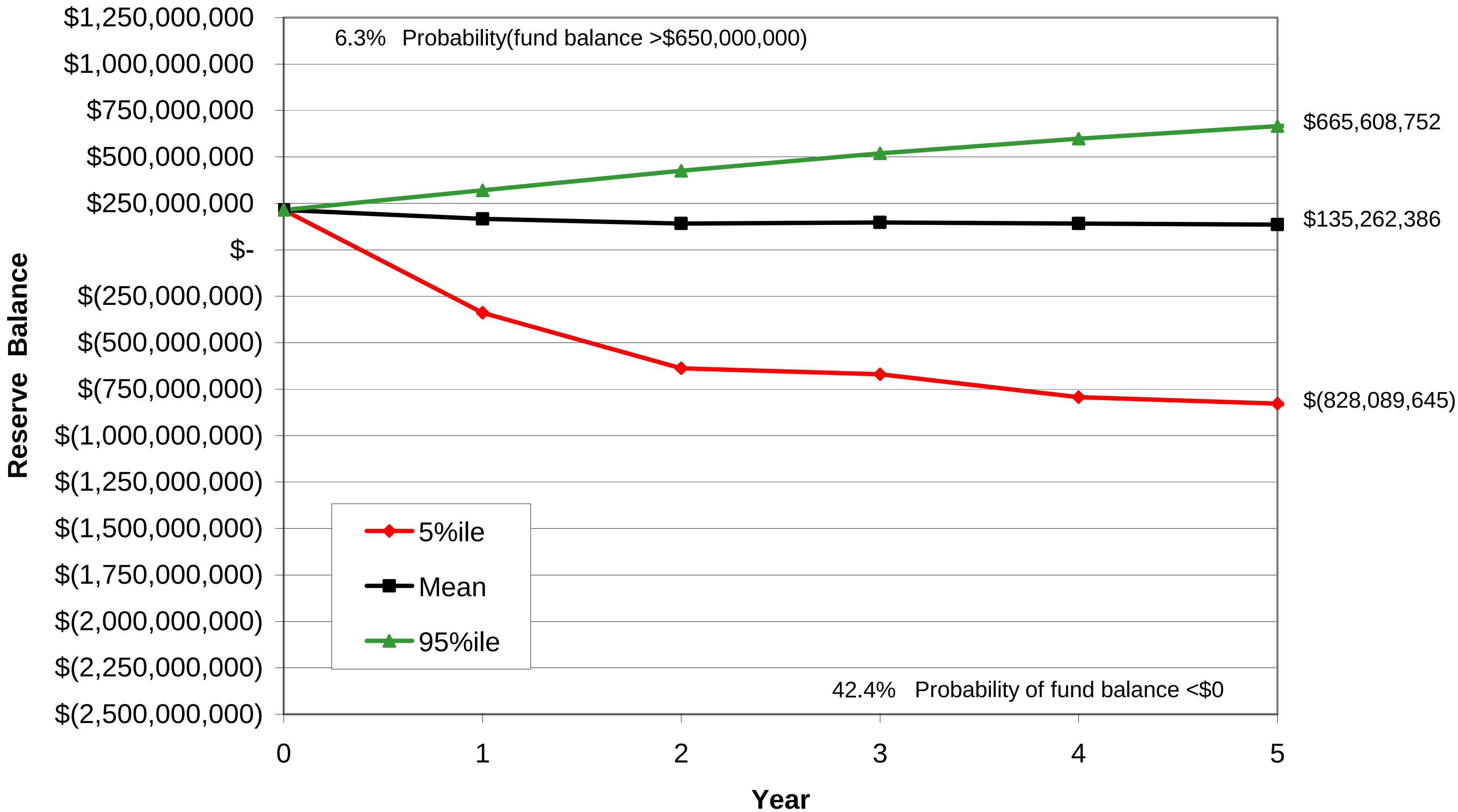

Figure 7-4: Reserve Performance Analyses: $100 million accrual, with 2 year Recovery

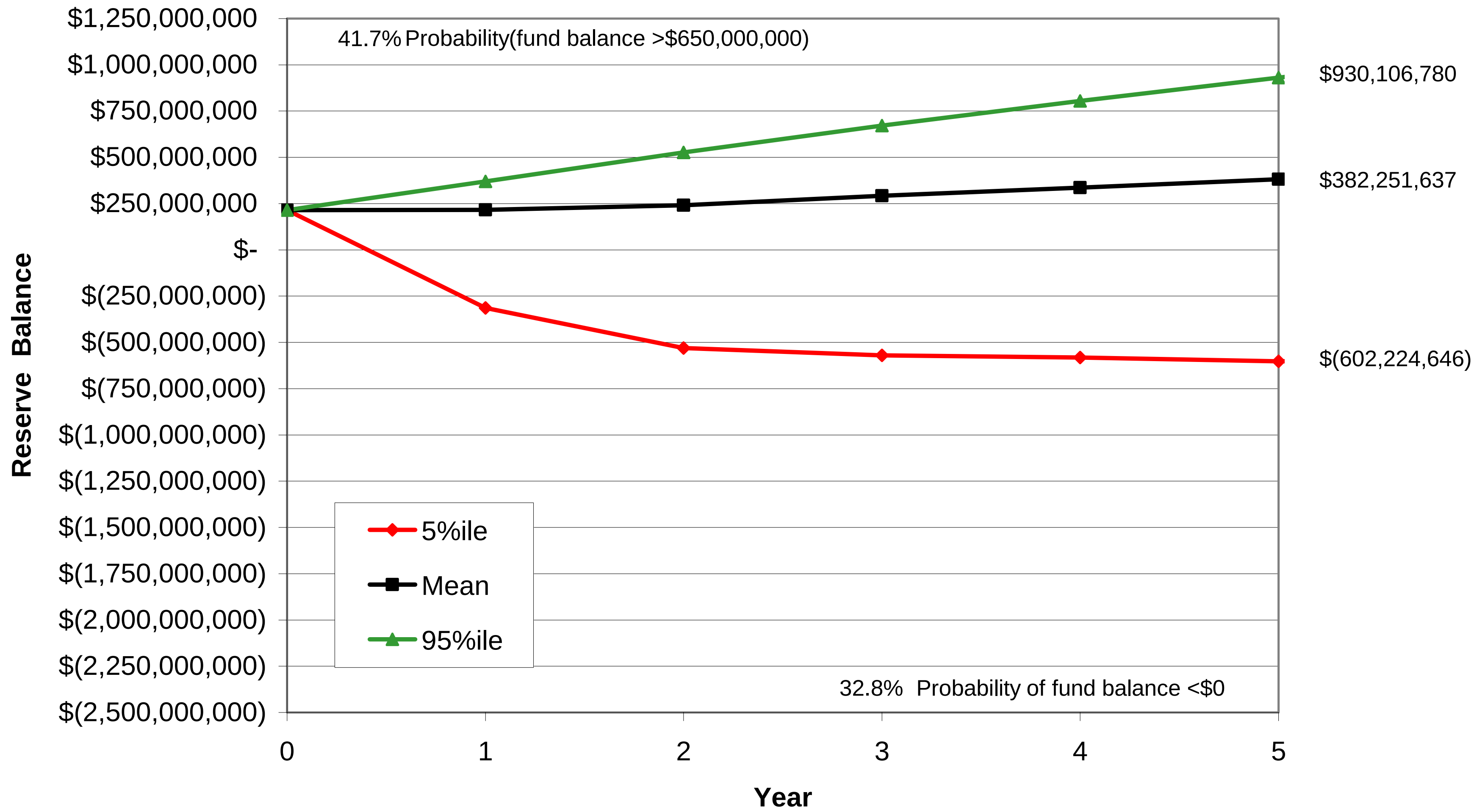

Figure 7-5: Reserve Performance Analyses: $150 million accrual, with 2 year Recovery

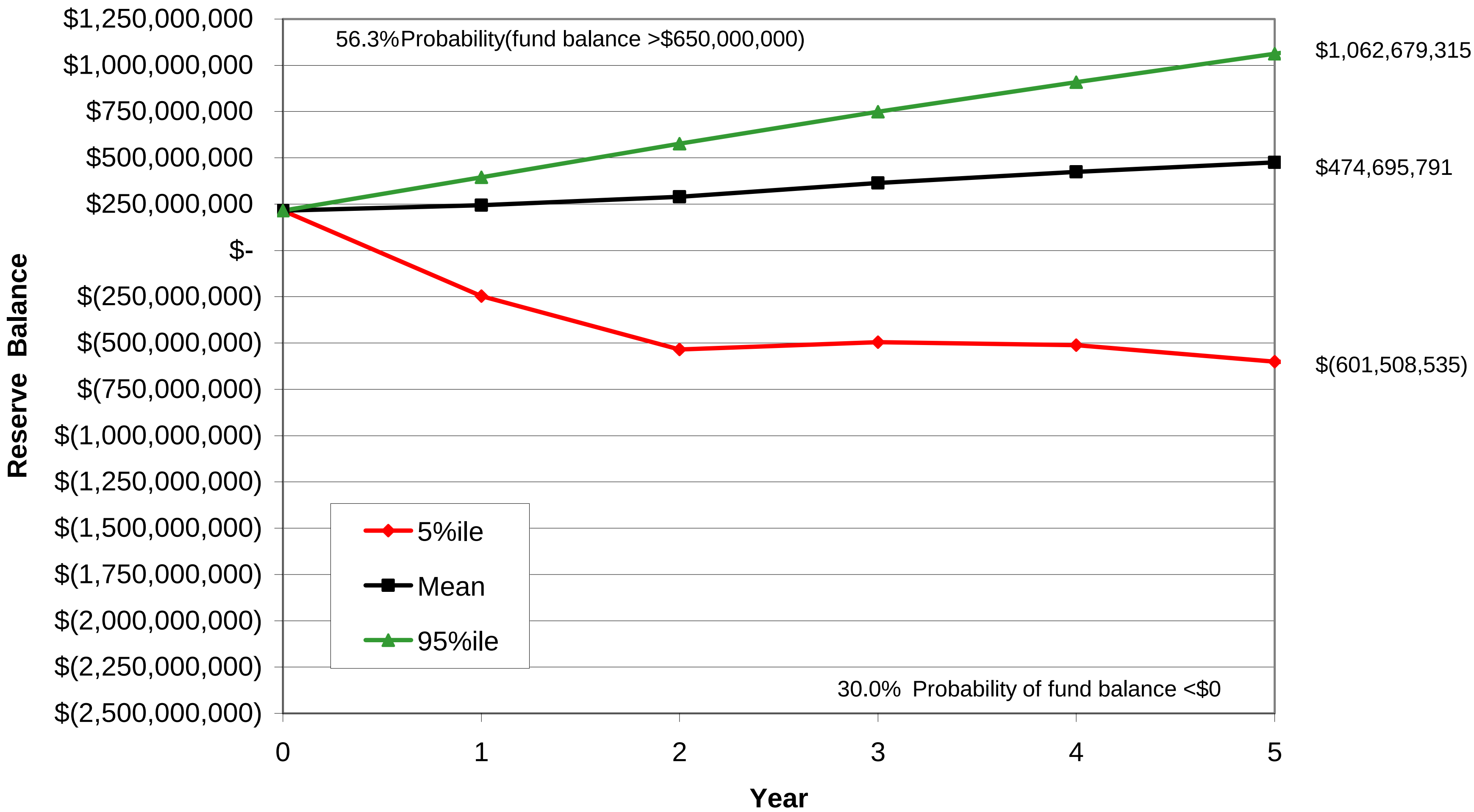

Figure 7-6: Reserve Performance Analyses: $175 million accrual, with 2 year Recovery

8. References

1. ““Florida Commission on Hurricane Loss Projection Methodology”, EQECAT, an ABS Group Company, February 2008.