



FINANCIAL RISK ASSESSMENT OF OFF-BOTTOM OYSTER CULTURE ON FLORIDA'S WEST COAST

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**Sea Grant**
Florida

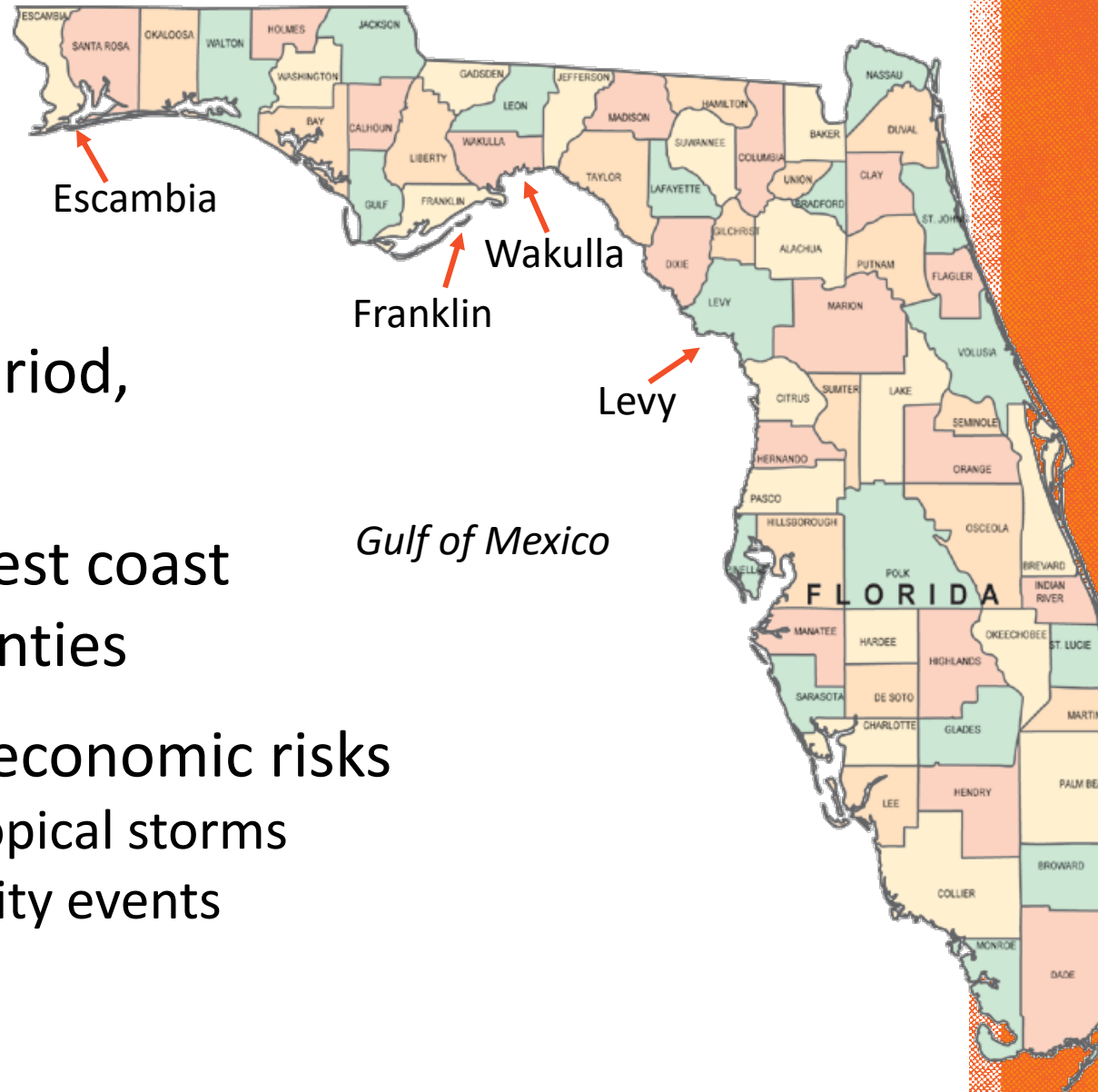
RISKS IN OFF-BOTTOM OYSTER CULTURE

- Oyster culture has risks, or uncertainties, that are beyond the grower's control
- Normal risk is related to occurrences that typically can happen during production
 - Mortality and costs generally are considered acceptable at certain level
- Financial risk assessment conducted as part of an applied research and demonstration project in 2015-17
- Environmental and economic risks evaluated for effects on oyster production and profitability



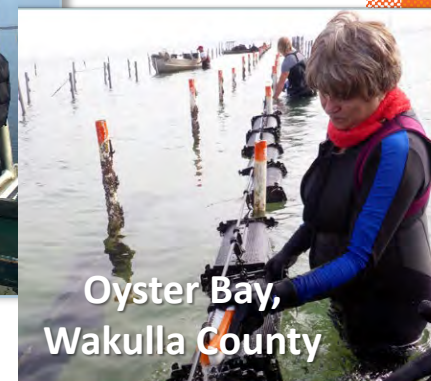
FINANCIAL RISK ASSESSMENT

- Evaluate effects of risks over 5-year period, 2018-22
- Risks in 4 Florida west coast oyster-growing counties
- Environmental and economic risks
 - Hurricanes and tropical storms
 - High and low salinity events
 - Market prices



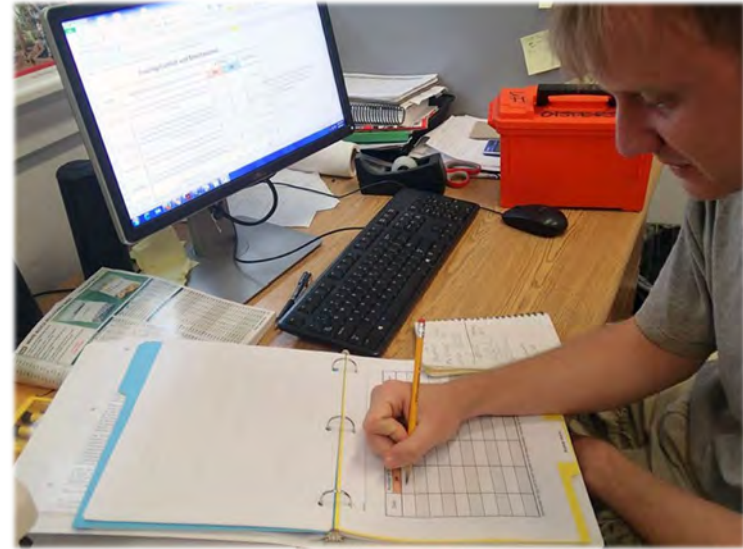
Growers and UF Field Trials, 2015-7

- Distributed 5,000 triploid and diploid oyster seed to 8 farmers in four counties for two growing seasons
- UF grew a similar amount at experimental lease
- Documented growth, survival, fouling
- Developed assumptions for Small-scale Farm Budget Model



Logbooks and Interviews

- Labor spent on each culture activity recorded in logbooks provided to growers
 - Planting
 - Fouling control
 - Bag transfer
 - Culling/sorting
 - Harvesting
 - Miscellaneous
- Growers interviewed for
 - Additional farm background
 - Capital and operational costs
 - Estimates of risk effects



Fouling Control and Maintenance				
Date	Method (for example, flipping, air drying, spraying)	# of Bags		Est. Time
		3N	2N	
8/11/2016	Examined bags but saw little to no fouling; a small amount of sea grass was on top of the bags and we picked it off by hand; did not flip bags	4	4	7 min 41 sec
8/17/2016	Two of the bags were flipped when we arrived but we believe it happened the night before. There was seagrass on the bags and some algae on the bags too that we needed to SCRUB off. We also flipped each bag.	4	4	1 hr 19 min 27 sec
8/22/2016	We flipped the bags to dry for aprox. 1 hour. After the hour we scrubbed the bags with brushes to get some of the dry algae off	4	4	1 hr 25 min 28 sec
8/29/2016	In anticipation of tropical storm, removed all 8 bags and brought to Clam Shack to hold. Did volume and bag height. Pictures. Will measure samples.	4	4	1 hr
9/21/2016	Arrived at lease and flipped the bags from the boat. Rusty and Carter flipped two bags while we went down the line at 8:30 AM	8	8	12 min
9/21/2016	Flipped bags back into the water, checked for water in the floats (1 bag had both floats filled with water), scraped of the barnacles from the buoys that are holding the longlines	8	8	40 min
9/28/2016	Arrived at least and flipped the bags for air dry: I was the only one in the water	8	8	9 min

Farm Budget Model

Production Assumptions (in the absence of risk):

- 5-year planning horizon
- Seed plantings increase each year
 - Year 1 – 10,000
 - Year 2 – 50,000
 - Year 3 – 150,000
 - Year 4 – 225,000
 - Year 5 – 250,000
- Planting seed size – R6mm
 - Transfer 3 bag sizes per crop
- 80% average survival per crop each year
- 90% of oysters marketable per crop each year



Farm Budget Model

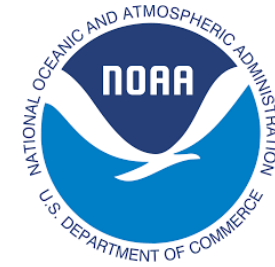
Financial Assumptions (in the absence of risk):

- Seed costs: \$25/1,000 oysters
- Average growing unit cost: \$33
 - Includes bags, floats, zip ties, ropes, pucks, longline clips, etc.
- Boat/motor costs*:
 - \$32,000 amortized over 10 years at 7% interest
 - \$4,800 annual payments
- Part-time labor: \$12/hour
 - Years 1 to 3 - assume no labor costs
 - Year 4 – 95 paid hours
 - Year 5 – 105 paid hours
- Output of net returns to owner/operator (pre-taxes)

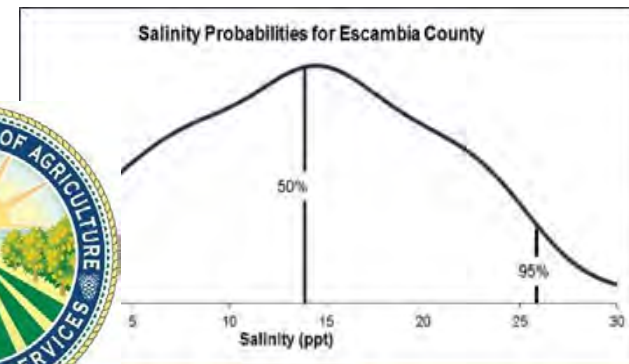


*For Franklin and Levy Counties, used partial budgeting for boat/motor and lease start-up costs

Environmental and Economic Data



- NOAA Interactive Hurricane Map from 1900 to 2017
- Salinity values at FDACS shellfish monitoring stations from 1980s to 2017
- VIMS historical market prices for cultured oysters from 2005-2016
- Incorporated into Risk Assessment Model



Environmental Risk: Hurricanes and Tropical Storms

Tropical Storm traveling NE (TS Colin), and Category 1 Hurricanes traveling N (H. Irma) and NE (H. Hermine) during study period, 2015-17

- Effects include increased mortalities, labor, repairs, operational and capital costs
- Varies among counties

County	Probability One Storm
Levy County	19%
Franklin County	19%
Wakulla County	16%
Escambia County	11%

Environmental Risk: Low Salinity

Low salinity event (≤ 10 ppt) for a sustained period (2 or more consecutive months)

- Effects include increased mortalities, labor and operational costs
- Varies among counties

County	Probability
Levy County - East	0%
Levy County - West	4%
Franklin County	0%
Wakulla County	11%
Escambia County	50%

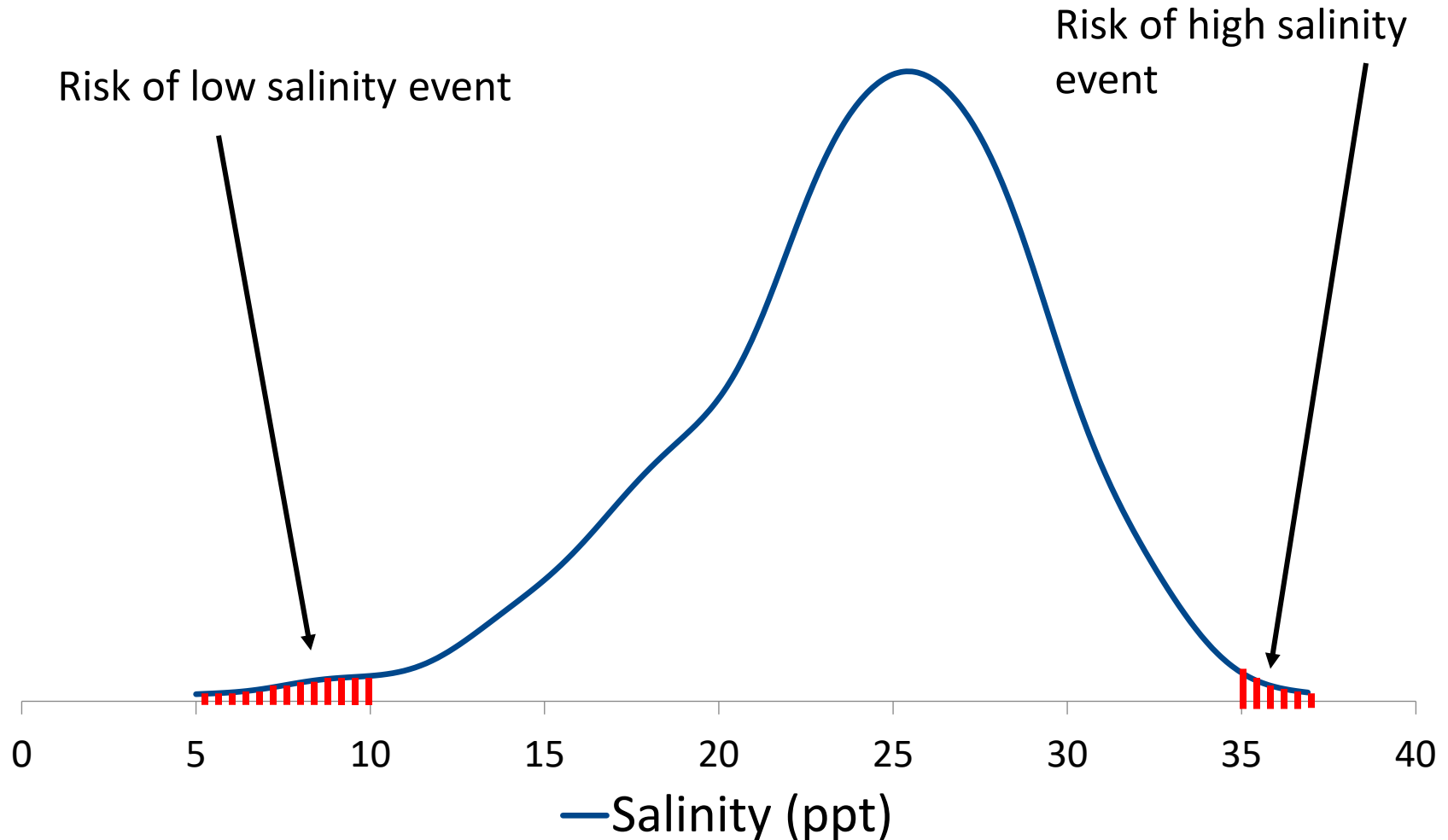
Environmental Risk: High Salinity

High salinity event (≥ 35 ppt) for a sustained period (2 or more consecutive months)

- Effects include increased mortalities, labor and operational costs
- Varies among counties

County	Probability
Levy County	0%
Franklin County	30%
Wakulla County	0%
Escambia County	0%

Salinity Distribution Lease Area, Levy County



*Data from UF monitoring station located at a Gulf Jackson AUZ

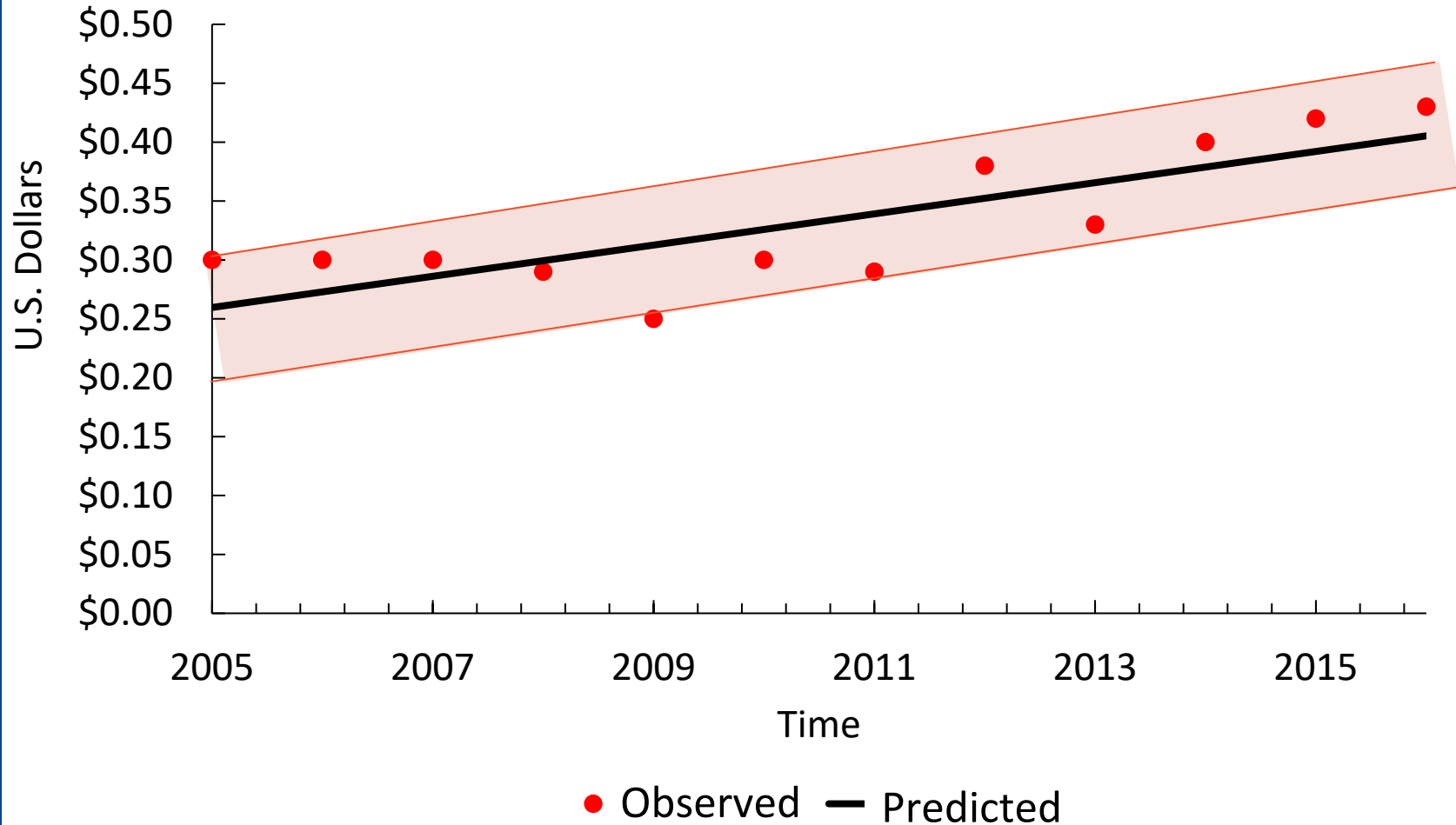
Economic Risk: Market Price

Changes in market price over 5-year period

- Average market price increases each year
- Variance is considered each year
- Does not vary among counties
- Effects include reduced profitability

Year	Average Projected Market Price
2018	\$0.43
2019	\$0.45
2020	\$0.46
2021	\$0.47
2022	\$0.49

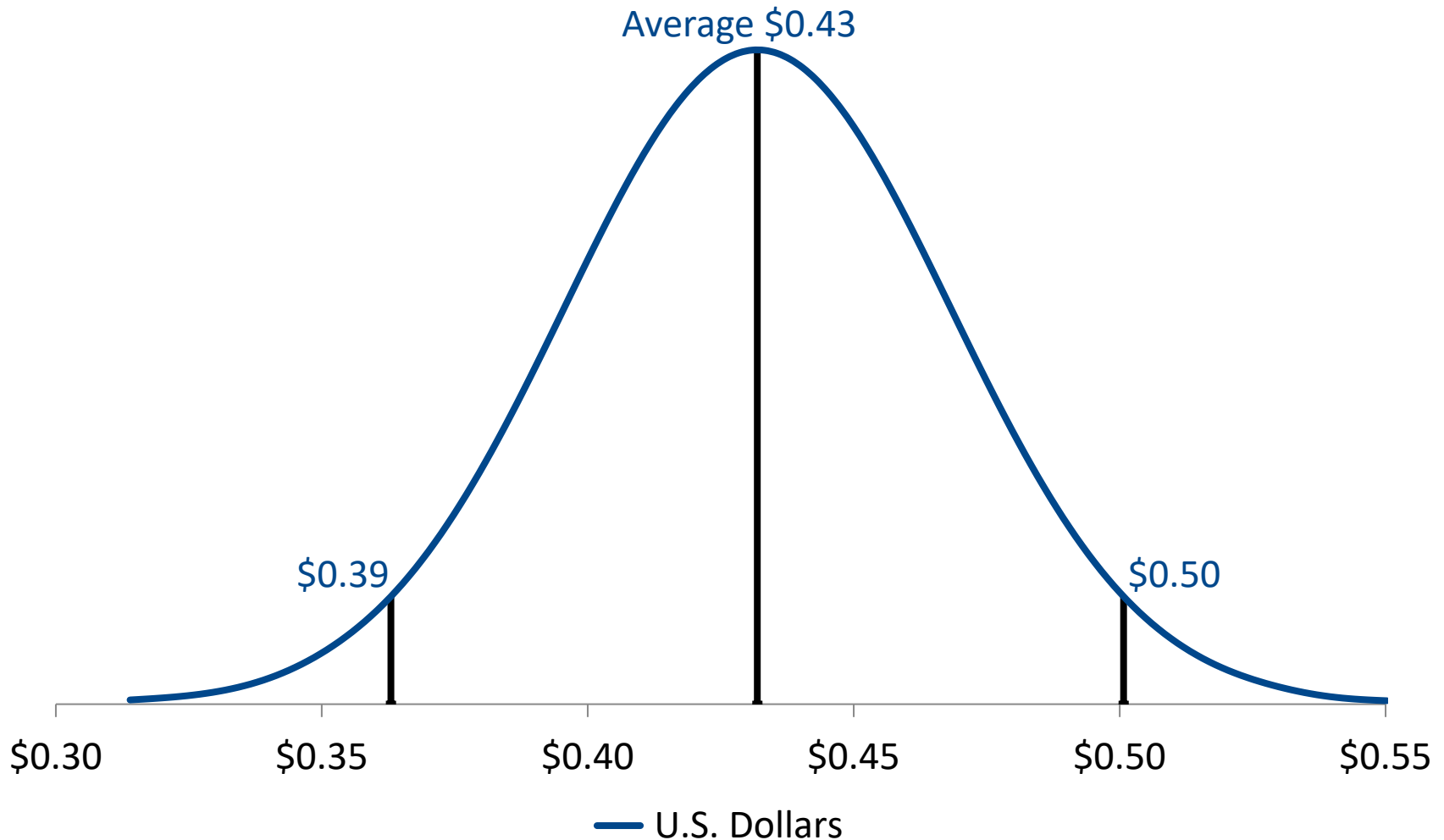
Observed and Predicted Values for Market Price



Market prices reported by VIMS for Virginia cultured oysters

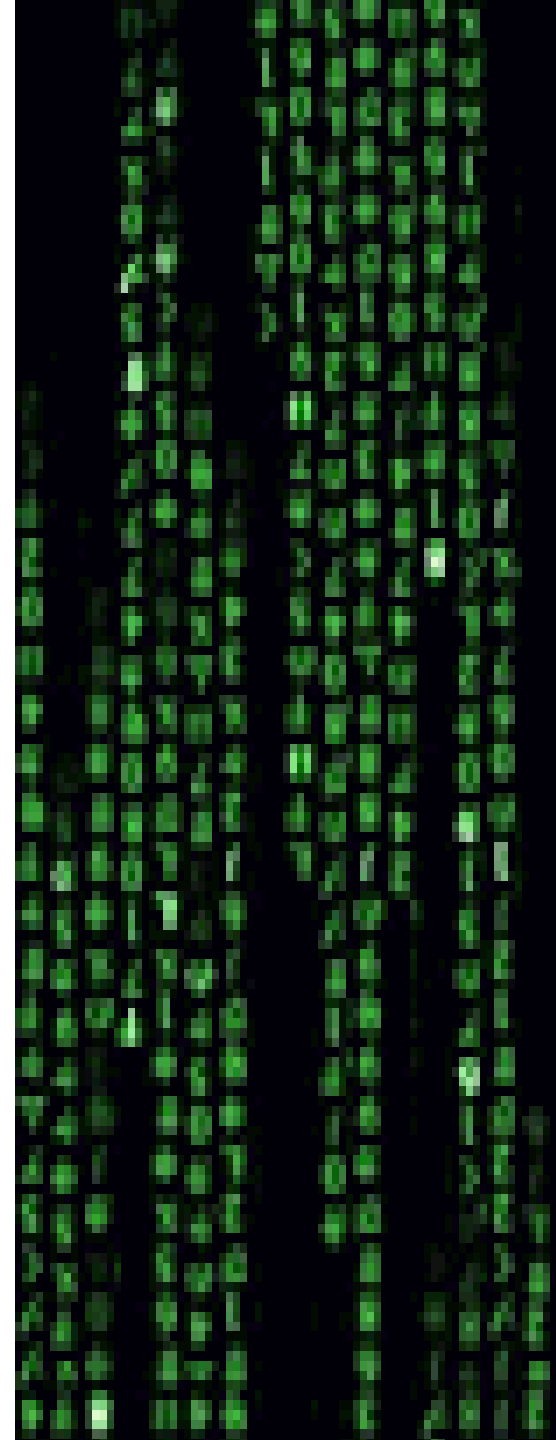
2018 Market Price

Risk is depicted as the possibility of obtaining any market price in this distribution

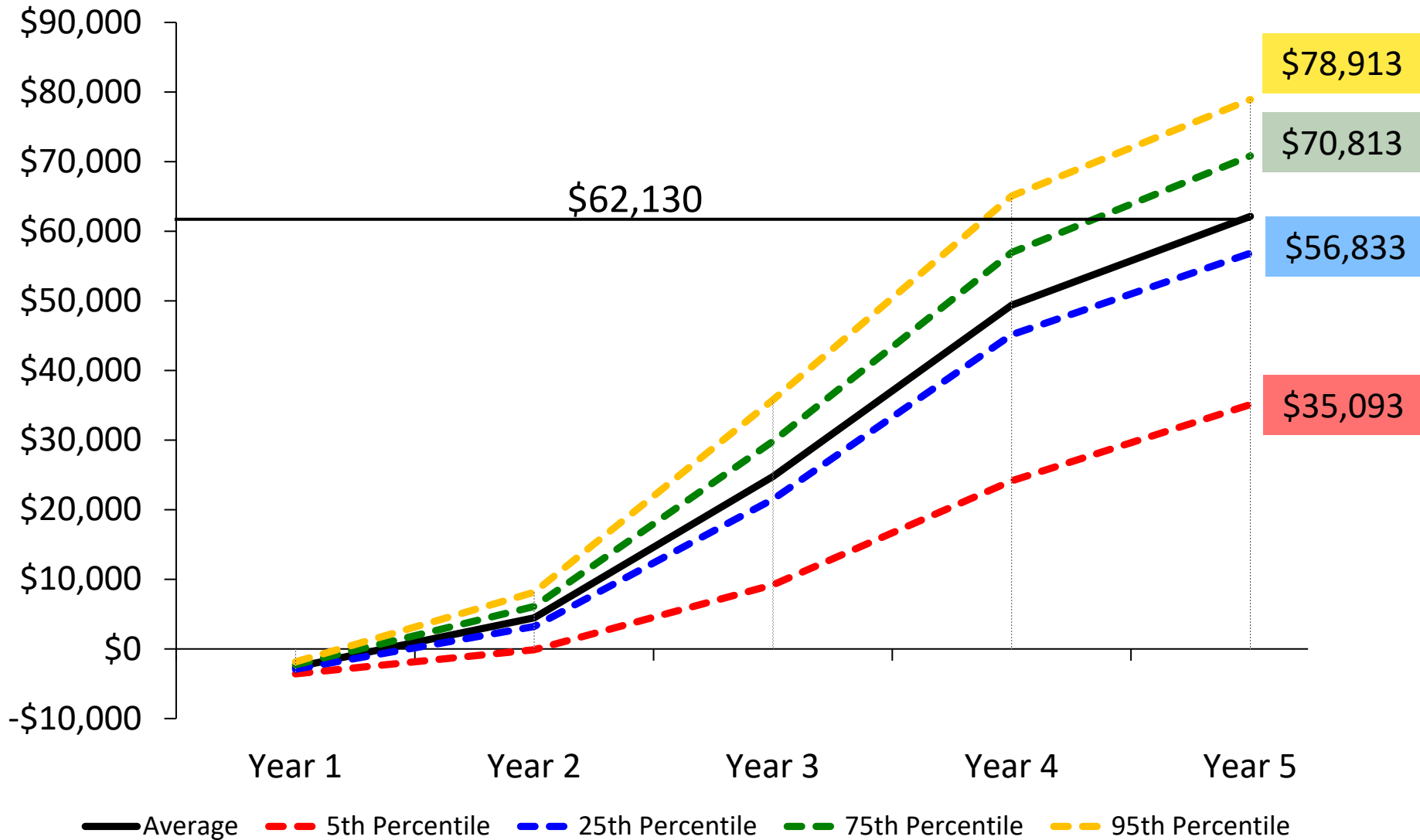


Simulation

- Microsoft Excel Add-on (Simetar) used to simulate risk and risk forecasting
 - Each environmental and economic risk scenario is simulated individually
 - Randomly selects values from distribution of each risk variable
 - Simulates Farm Budget Model using Latin Hypercube Sampling method
 - Randomly selects a value for each potential effect for each risk 1000 times per county
 - Provides a distribution of profitability estimates for each county on annual basis

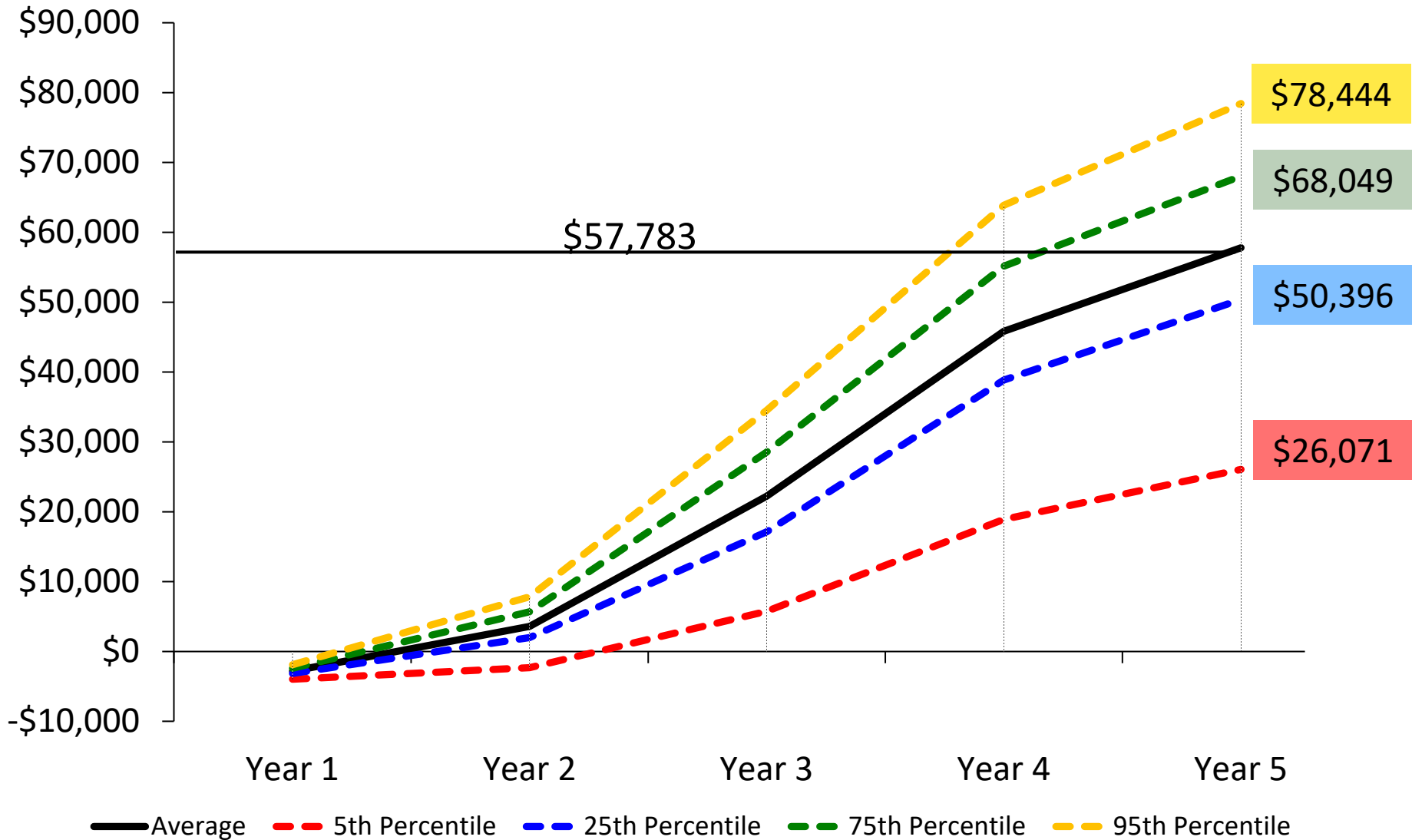


NET INCOME RESULTS: LEVY COUNTY



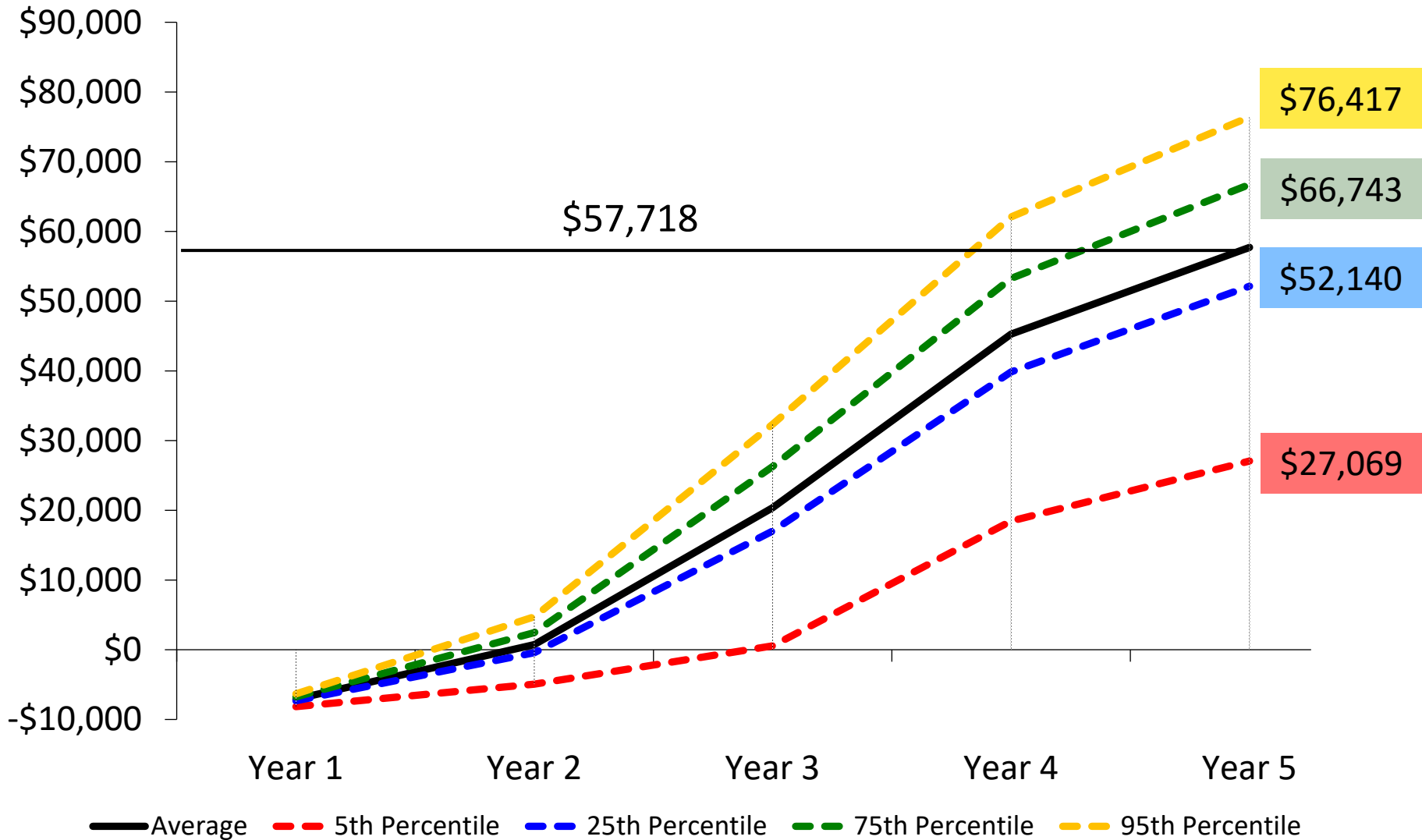
COMBINED RISKS – 23%

NET INCOME RESULTS: FRANKLIN COUNTY



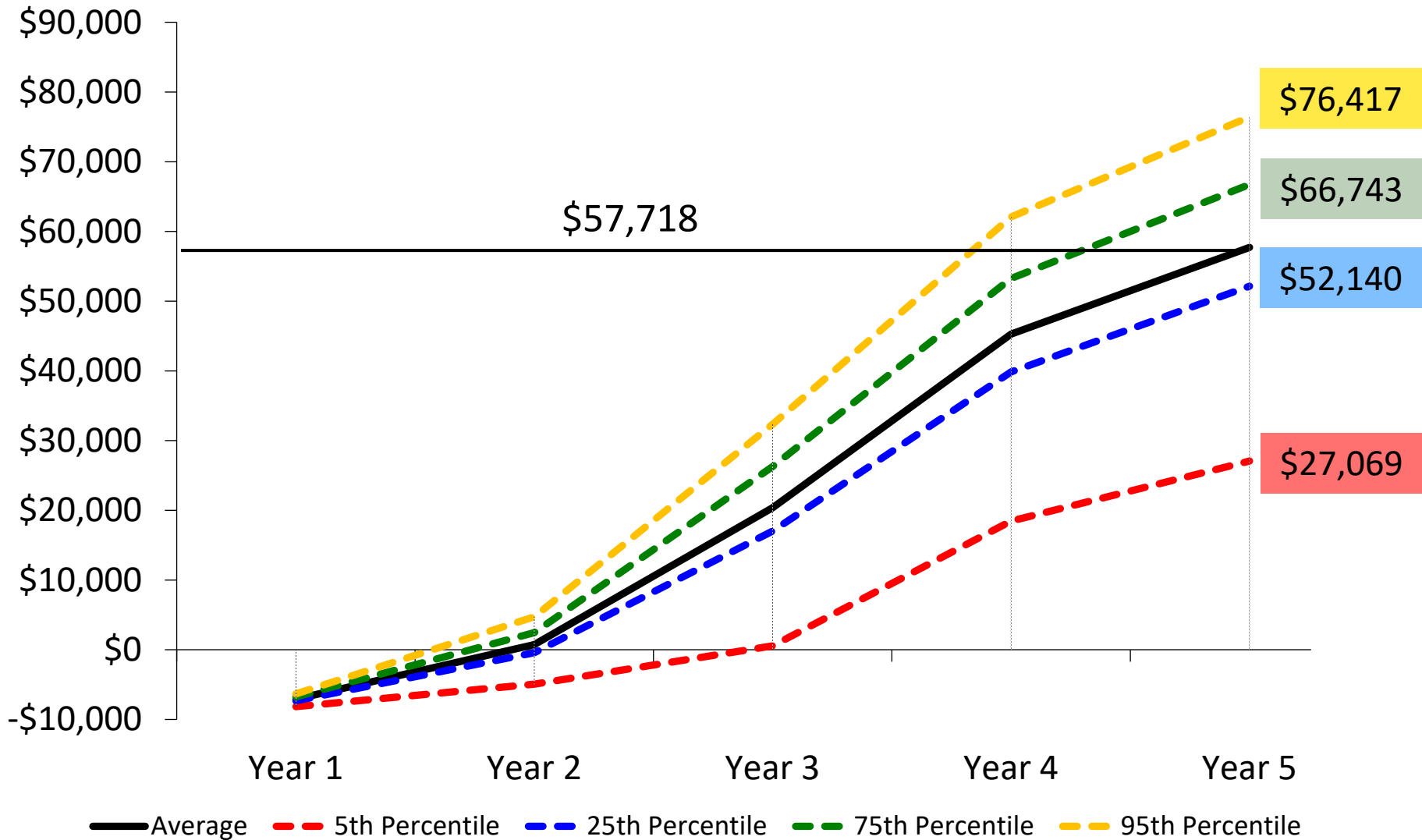
COMBINED RISKS – 51%

NET INCOME RESULTS: WAKULLA COUNTY



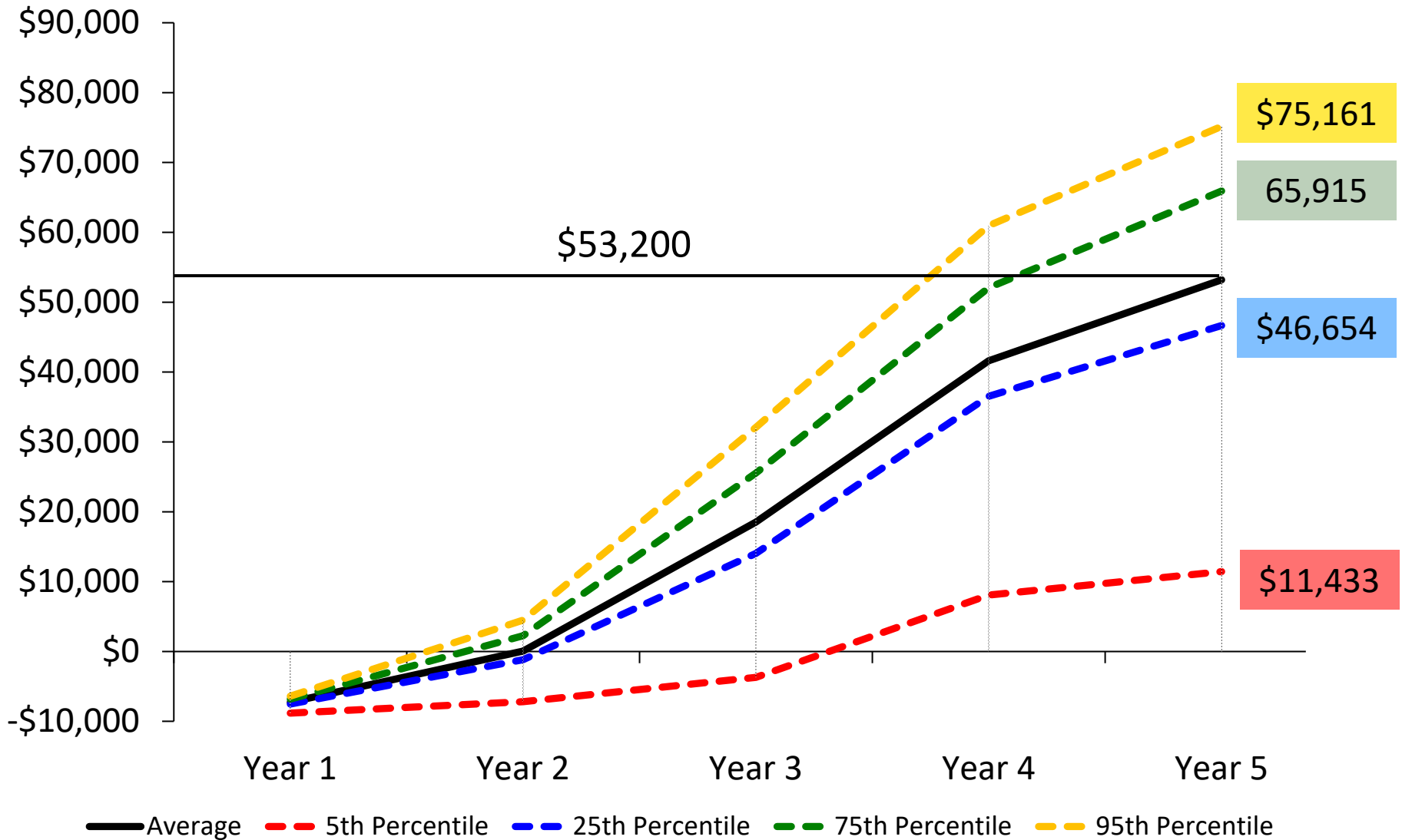
COMBINED RISKS – 32%

NET INCOME RESULTS: WAKULLA COUNTY



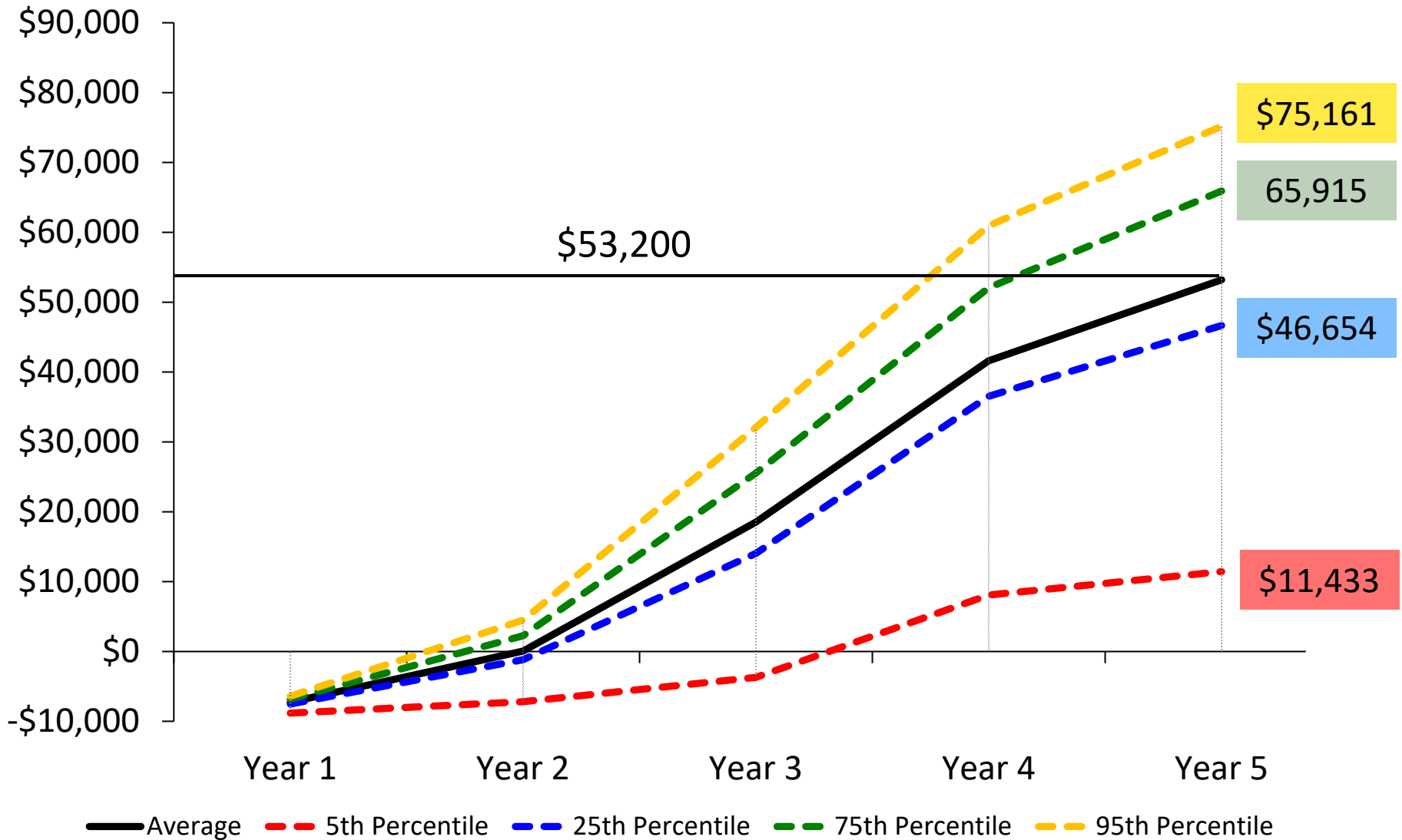
COMBINED RISKS – 32%

NET INCOME RESULTS: ESCAMBIA COUNTY



COMBINED RISKS – 61%

NET INCOME RESULTS: ESCAMBIA COUNTY



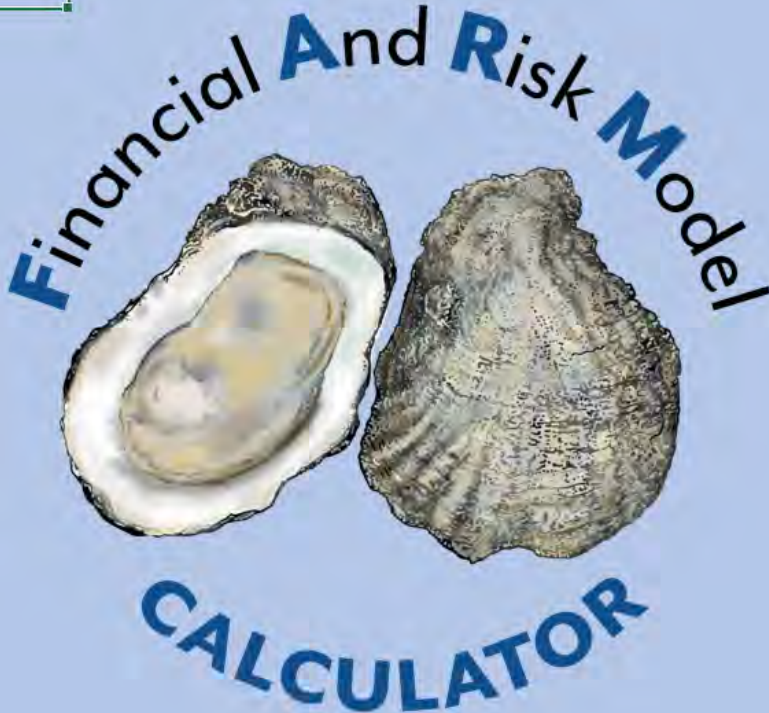
COMBINED RISKS – 61%

SUMMARY

- Environmental risks vary among counties based on probabilities of occurrence
- As more oysters are cultured, net returns increase, but risks also increase
- Almost 100% chance of all farms being profitable at the end of year 5 when considering all risk variables
- Financial risk assessment allows
 - Perspective and new oyster growers to understand costs and earnings associated with investment in oyster culture
 - Oyster growers in their decision-making pertaining to levels of risk that may affect their farms in a production season



Oyster FARM Calculator



The logo for the Oyster FARM Calculator features two oysters: one open showing the shell and the other closed. The text "Financial And Risk Model" is arched over the oysters, and "CALCULATOR" is written in a bold, blue, sans-serif font below them.

Introduction
Farm Inputs
Income Statement
Risk Outputs
Risk Fan Graph
Risk StopLight Chart
About the Calculator
Credits and References

Tool allows growers to input their own costs and production methods to generate their farm's financial risk situation

Download at <http://shellfish.ifas.ufl.edu>



Enter Your Farm Inputs

Year 1 Year 2 Year 3 Year 4 Year 5

5	Where is your lease located?	Levy County - West				
6	What are your annual certification and lease rental fees?	\$ 156.00	\$ 156.00	\$ 156.00	\$ 156.00	\$ 156.00
7	How many oysters are you planting each year?	50,000	100,000	200,000	350,000	500,000
8	What is the cost per 1,000 oyster seed?	\$ 15.00	\$ 20.00	\$ 20.00	\$ 20.00	\$ 20.00
9	What is your average market price per oyster?	\$ 0.40	\$ 0.45	\$ 0.45	\$ 0.50	\$ 0.50
10	What percentage of oysters brought to market are able to be sold?	90%	90%	85%	85%	85%

13	What culture method do you use?	Floating Bags				
14	What mesh size bags/baskets do you use each year?					
15	Bag/basket mesh size (mm)	9				
16	Average cost per bag/basket	\$ 5.00	\$ 5.00	\$ 5.00	\$ 5.00	\$ 5.00
17	Number of bags/baskets purchased	50	50	50	50	50
18	Bag/basket mesh size (mm)	14				
19	Average cost per bag/basket	\$ 6.00	\$ 6.00	\$ 6.00	\$ 6.00	\$ 6.00
20	Number of bags/baskets purchased	200	200	200	200	200
21	Bag/basket mesh size (mm)					

27	How many support gear units are purchased each year?	200	200	200	200	200
28	What is your average cost per support gear unit?	\$ 20.00	\$ 20.00	\$ 20.00	\$ 20.00	\$ 20.00
29	What are additional costs for expendable supplies?	\$ 50.00	\$ 50.00	\$ 100.00	\$ 100.00	\$ 200.00

31 Do you have a boat/motor payment?

34	What are your estimated fuel costs each year?	\$ 250.00	\$ 350.00	\$ 450.00	\$ 450.00	\$ 450.00
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36	How many hours of labor are used per week?	10	15	20	25	40
37	What is the average hourly wage?	\$ 15.00	\$ 18.00	\$ 18.00	\$ 20.00	\$ 20.00

CALCULATE

Allow time for calculation!



Farm Income Statement

	Year 1	Year 2	Year 3	Year 4	Year 5
Total Fixed and Variable Costs	\$ 14,456.00	\$ 22,046.00	\$ 28,876.00	\$ 39,156.00	\$ 57,856.00
Additional Costs Due to All Risks					
Labor Wages	\$ 9.66	\$ 11.23	\$ 10.28	\$ 11.00	\$ 11.81
Capital Costs	\$ 8.68	\$ 50.77	\$ 43.19	\$ 11.29	\$ 8.79
Total Additional Costs Due to All Risks	\$ 18.34	\$ 62.00	\$ 53.47	\$ 22.29	\$ 20.60
Total Farm Costs	\$ 14,474.34	\$ 22,108.00	\$ 28,929.47	\$ 39,178.29	\$ 57,876.60
Oyster Plantings and Mortalities					
Number of Oysters Planted	50,000	100,000	200,000	350,000	500,000
Normal Mortality	20%	20%	20%	20%	20%
Mortality from Major Storms	1%	1%	1%	1%	1%
Mortality from an Extended Low Salinity Event	0%	0%	0%	0%	0%
Mortality from an Extended High Salinity Event	0%	0%	0%	0%	0%
Marketable Oysters	35,644	71,131	134,503	235,493	334,908
Farm Revenues					
Market Price per Oyster	\$ 0.40	\$ 0.45	\$ 0.45	\$ 0.50	\$ 0.50
Total Farm Revenue	\$ 14,257	\$ 32,009	\$ 60,526	\$ 117,747	\$ 167,454
Profitability (Pre-tax Net Income)	\$ (216.86)	\$ 9,901.08	\$ 31,596.85	\$ 78,568.30	\$ 109,577.37

RISK STOPLIGHT CHART determines probability of a farm's net income falling between a range of values determined by grower



ACKNOWLEDGEMENTS

- ALL PARTICIPATING GROWERS
- FUNDING: NOAA National Sea Grant, 2015-18

