

Lake Okeechobee Assessment & Hydropower Implementation

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for Privacy*

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OUTLINE

- Introduction
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- Project Description
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- Recommendation
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BACKGROUND

Lake Okeechobee

- Located in central and southern Florida and considered the second largest freshwater lake within the USA
- Water Supply and flood prevention control system
- Surface Area of 730 square miles
- Depth of 12 feet
- Great magnitude of species
- Helps farmers and communities around the lake
- Recreational Purposes, such as boating and fishing



BACKGROUND

- Hydroelectric Power
 - Great Source of energy
 - Reliable
 - Versatile
 - Low Cost



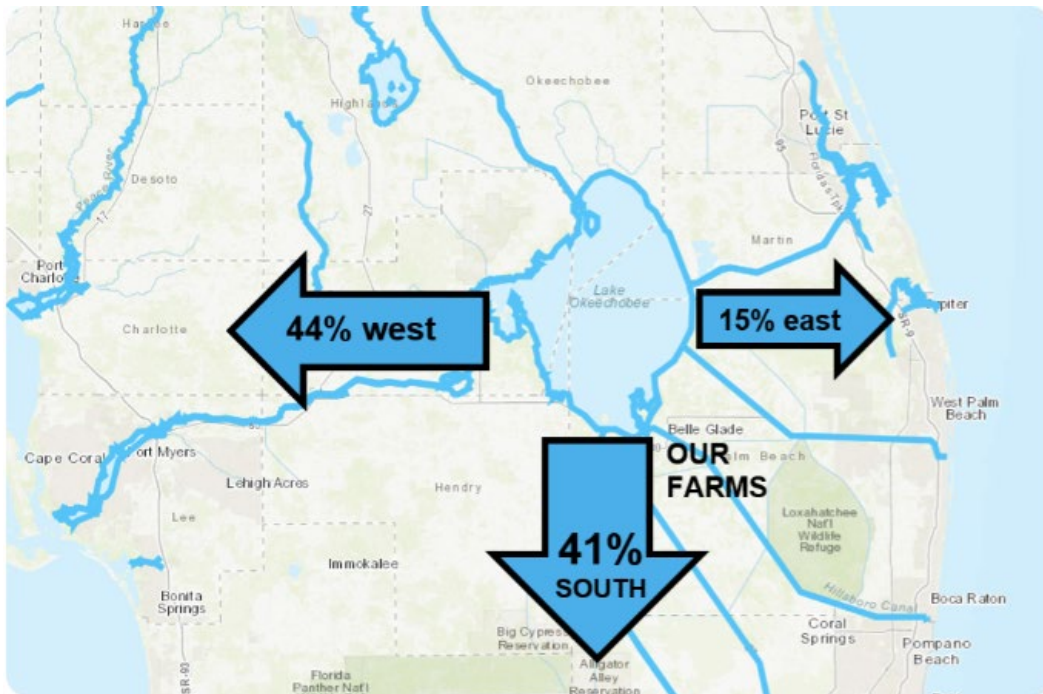


OBJECTIVES

- Create a complete assessment of Lake Okeechobee that includes:
 - Inflows
 - Outflows
 - Hydraulic Systems
- Calculating the potential energy the lake can generate using any flow.

DESCRIPTION

- Mostly managed by the South Florida Water Management District and the United States Army Corps of Engineers.
- Lake supplies water for salinity control, groundwater control, agricultural irrigation, among others.



- 44% West, Ft. Myers, Caloosahatchee River
- 15% East, St Lucie River
- 41% South, Miami Canal

Approximately,

- 31 culverts
- 9 locks
- 5 dams
- 7 spillways
- 3 weirs

Class I Drinking Water

METHODOLOGY

- Data obtained from the United States Army Corps of Engineers

Equation for Power Output of a Dam:

$$P = \eta * \rho * g * h * Q$$

- η , efficiency of the turbine
- ρ , density of water
- g , gravity
- h , head loss
- Q , flow

Equation for Energy (kwh)

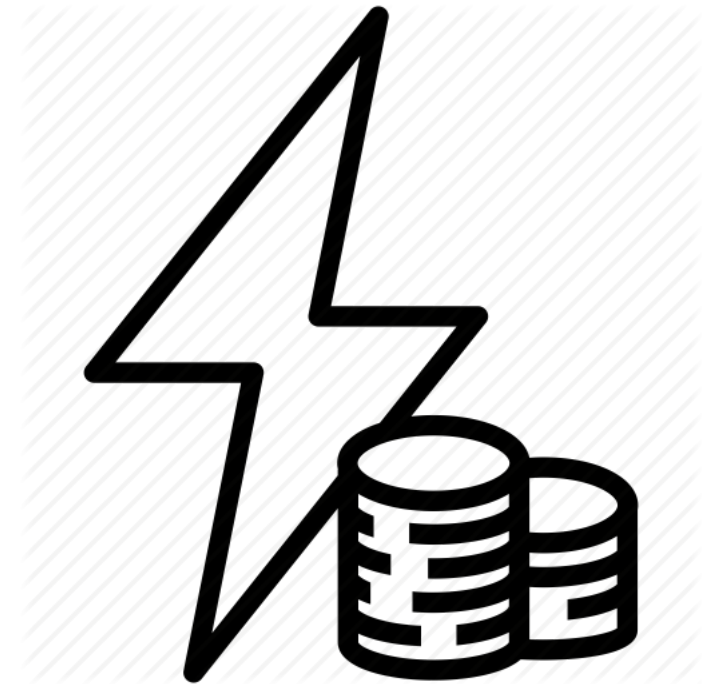
$$E_{(kwh)} = P_{(kw)} * t_{(h)}$$

- P , power output
- t , time period

- Average Households Energy Consumptions is 28.9kw
 - The kilowatts in US cost around \$0.1142

$$\text{Avg Households} = \frac{E}{28.9} = \text{Amount of Houses}$$

$$\text{Earnings} = E * 0.1142 = \text{Amount of earnings per hour}$$



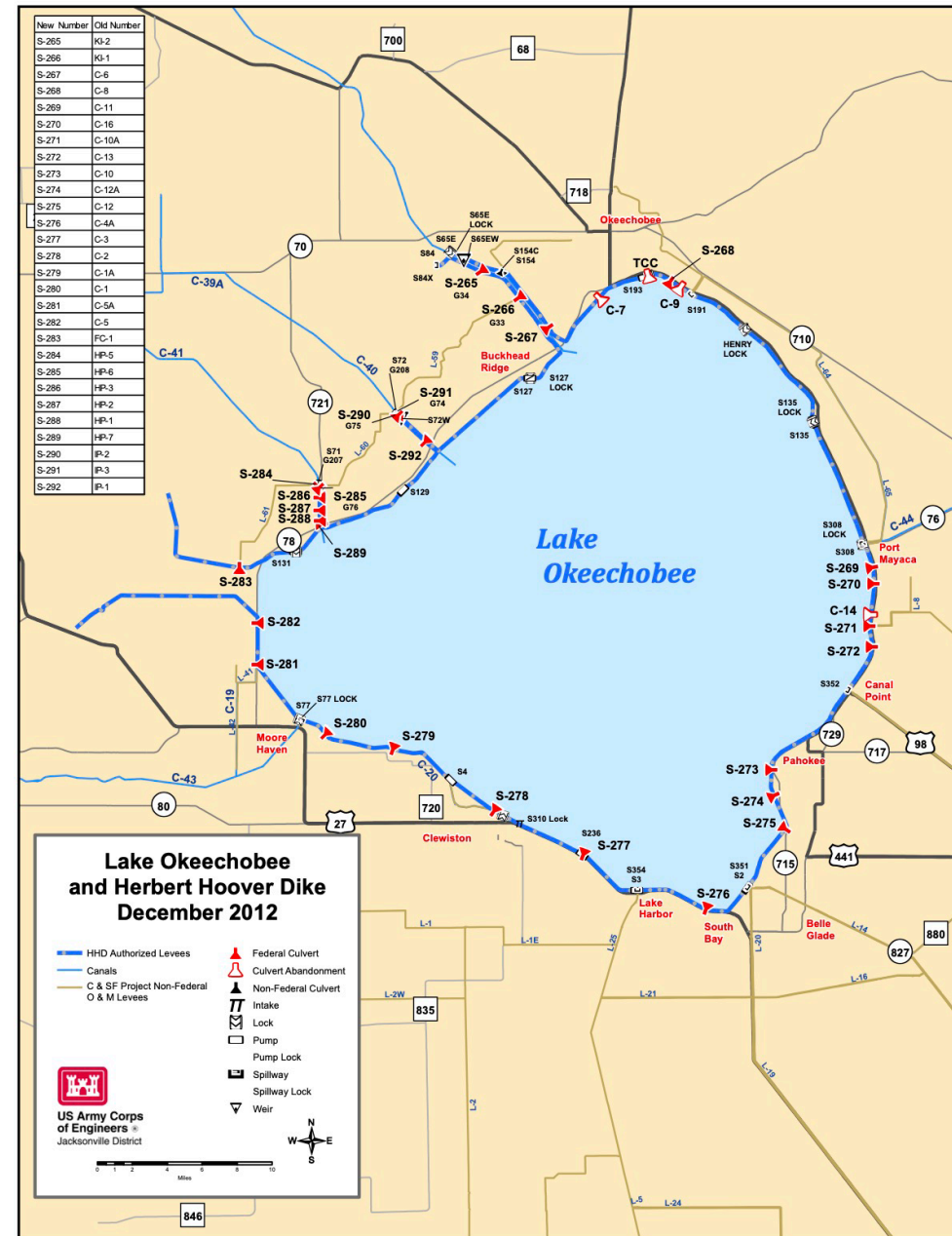
RESULTS

Inflows:

- Kissimmee River
- Fisheating Creek
- L-62 Canal
- Taylor Creek
- Slough Ditch
- Harney Pond Canal
- Indian Prairie Canal
- 8 Pump Stations
- C5 Culvert

Outflows:

- Miami Canal
- North New River Canal
- West Palm Beach
- L8 Canal Point
- Moore Haven
- Port Mayaca
- 4 Culverts



RESULTS

For calculations of Potential Energy, the following were used:

Inflows

- Kissimmee River
- Chancy Bay Creek
- Fisheating Creek

Outflows

- Moore Haven
- Port Mayaca
- North New River Canals
- Canal Point
- Miami Canal
- L-8 @ CP

Name	Flow	AVG Q (cfs)
Kissimmee River	Inflow	716
Chancy Bay Creek	Inflow	170
Fisheating Creek	Inflow	8
Moore Haven	Outflow	1248
Port Mayaca	Outflow	224
North New River	Outflow	662
Canal Point	Outflow	542
Miami Canal	Outflow	195
L - 8	Outflow	301



ENERGY

- Assumptions of 4 ft head was made due to the fact of the water level.
- Time period of 24 hours

Name	Power (kw)	Energy(kwh)	Households
Kissimmee	51.43	1234	43
Chancy Bay	12.21	293	10
Fisheating	0.57	13.8	0
Moore Haven	358.5	8605	298
Port Mayaca	64.27	1542	53
North New	190	4565	158
Canal Point	156	3738	129
Miami Canal	56.1	1346	47
L - 8	86.5	2076	72

Earnings

Using an estimate by the EIA,
the kwh costs \$0.1142

Name	Hourly	Daily	Monthly
Kissimmee	\$141	\$3,383	\$101,485
Chancy Bay	\$33.47	\$803	\$24,096
Fisheating	\$1.57	\$37.80	\$1,134
Moore Haven	\$983	\$23,585	\$707,559
Port Mayaca	\$176	\$4,228	\$126,831
North New	\$521	\$12,512	\$375,357
Canal Point	\$427	\$10,247	\$307,423
Miami Canal	\$154	\$3,691	\$110,722
L - 8	\$237	\$5,692	\$170,753

CONCLUSION

- This assessment shows the importance of Lake Okeechobee and how it impacts South Florida
- The results for potential energy demonstrate how effective and beneficial is an installation of these systems on the lake.
- It has to be considered, these calculations were made with known flow data but other hydraulic structures could be used.





RECOMMENDATION

- It is recommended the installment of a hydropower system.
- A zero-head system should be considered

REFERENCES



- South Florida Water Management District. *Lake Okeechobee*. <https://www.sfwmd.gov/our-work/lake-okeechobee#:~:text=Lake%20Okeechobee%20provides%20natural%20habitat,to%20sport%20and%20commercial%20fisheries>.
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THANK YOU!

ANY QUESTIONS?

