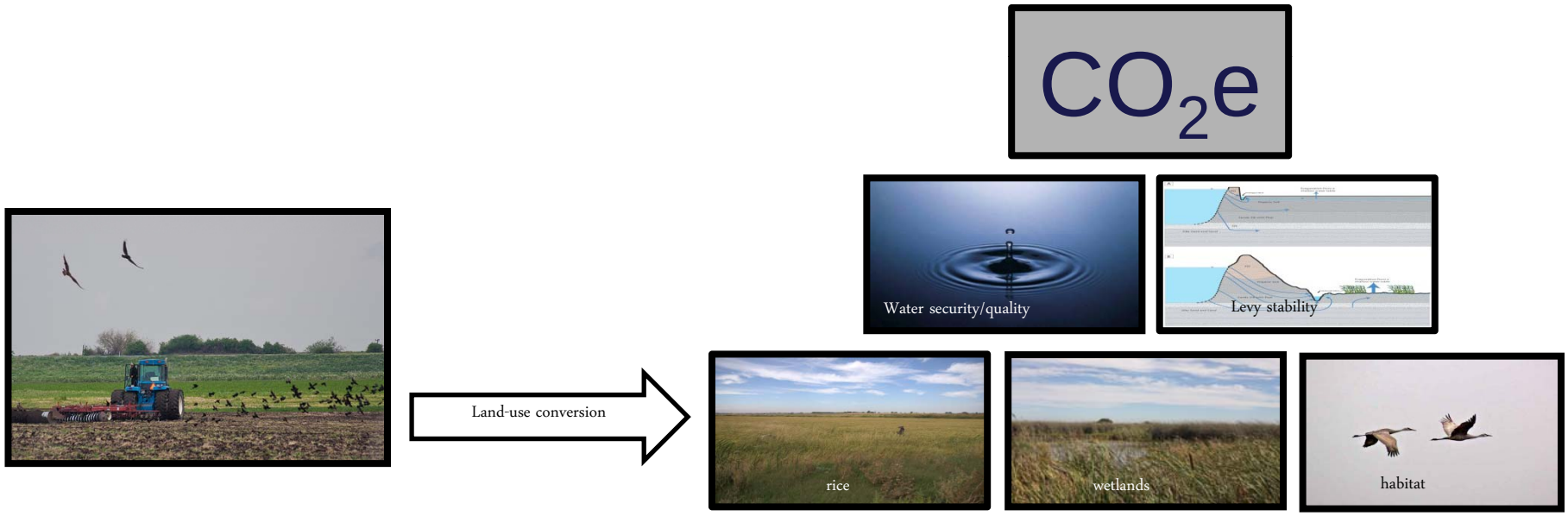
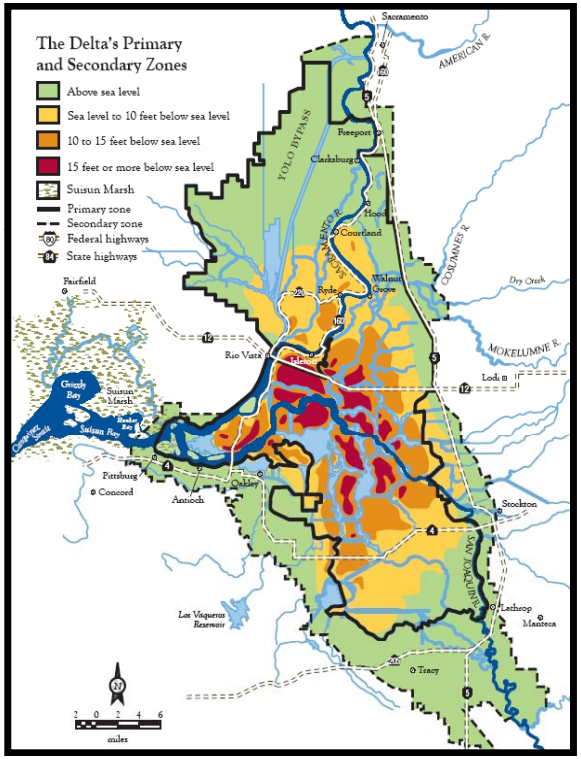
Offset Credit Stacking in the Sacramento-San Joaquin Delta?



EPRI Greenhouse Gas Emissions Offsets Workshop #13 "***Offset Credit Stacking***"
8 November 2012

Belinda Morris, American Carbon Registry

The Sacramento-San Joaquin Delta



High levels of land subsidence

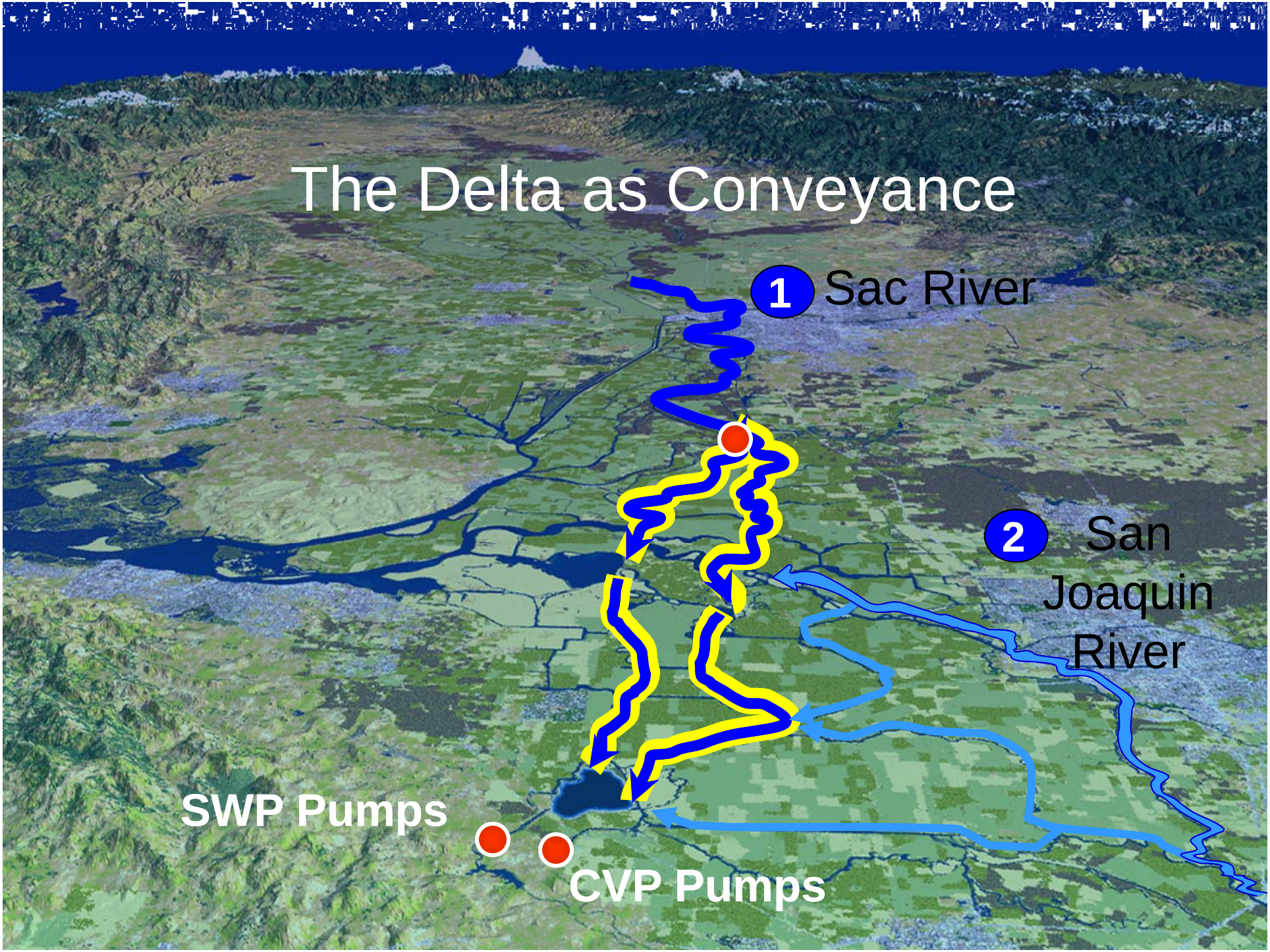
- Cannot restore wetlands on subsided lands

Fragile levees threaten water supply

- Delta supplies water to 30M people

Large GHG emissions from oxidation of peat soils

- ~8 metric tons CO_2e / acre / year


The Delta as Conveyance
1 Sac River
2 San Joaquin River
SWP Pumps
CVP Pumps

Twitchell Island Pilot Wetland

-Two 7 acre wetlands, established in 1997
-Continuously flooded, freshwater, non-tidal
-Highly managed

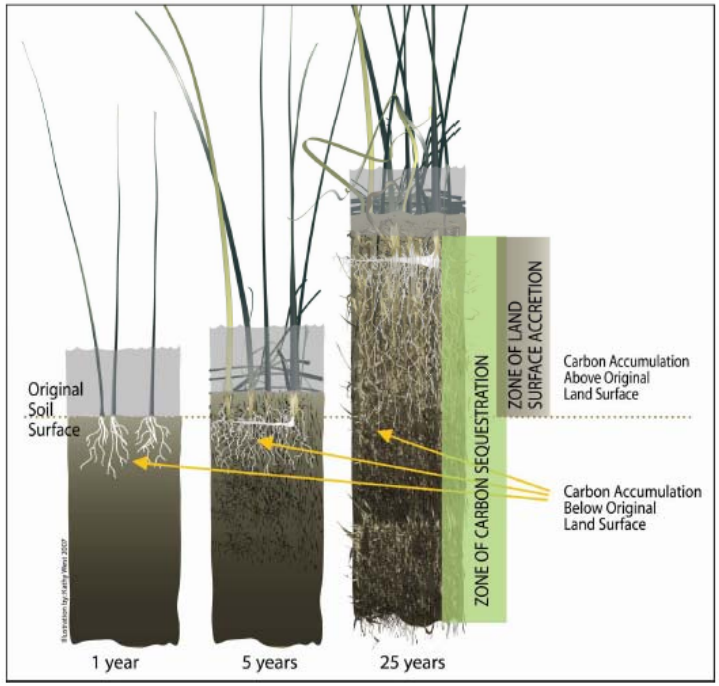


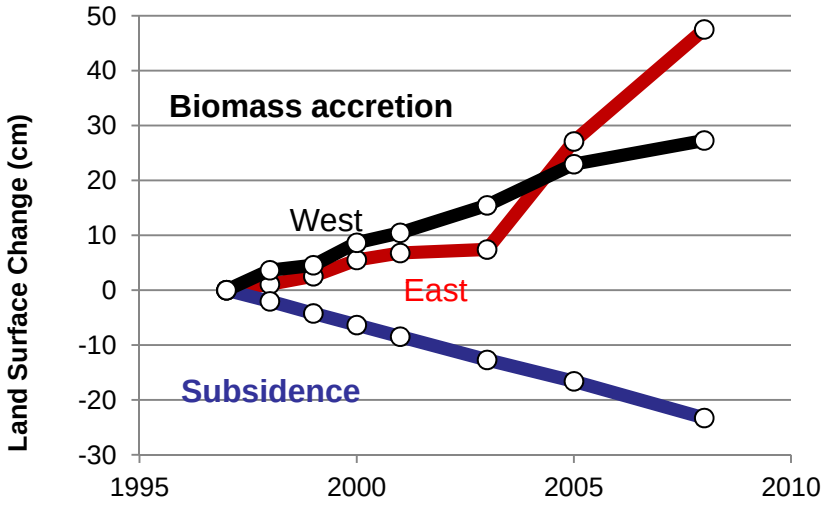
Figure 1. Conceptual model of wetland accretion process.
Diagram shows how carbon and land surface are accreted during wetland growth on subsided Delta islands. Conceptual model developed from 10 years of experimental data.

Wetlands replace lost peat soils - reverse subsidence, rebuild land surface

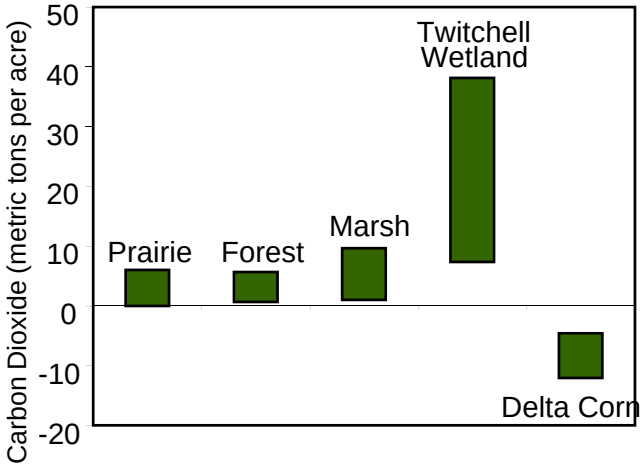
Wetlands eliminate current GHG emissions - CO_2 (~ $7tCO_2e$) and N_2O

Average 18 MT CO_2 / acre / year captured by plant growth and preserved

Wetland Performance



Miller, R.L., Fram, M.S., Wheeler, G., Fujii, R., 2008. Subsidence reversal in a re-established wetland in the Sacramento-San Joaquin Delta, California, USA. *San Francisco Estuary and Watershed Science*, 6(3): 1-24.



Climate Benefits:

- Reduces current GHG emissions
- Large bio-sequestration potential

Co-benefits:

- Improves water quality by trapping nutrients
- Stabilizes levees by reducing hydrostatic pressure
- Provides habitat
- May permit reopening of these wetlands in the future to tidal action

Avoided Costs of Levy Failure

		Subsidence (BAU)	Accretion	Difference*
Average Estimated Levee Failures (50 yrs)		4.09	2.66	1.43
Average NPV of In-Delta Costs (Million-2012$)	$90M repair	$408	$267	$141
	$195M repair	$886	$578	$308

Our simulations suggest an avoided cost of ~$**141 - 308** million, as a result of 1.43 less levee failures on average over the next 50 years.

Preliminary Economic Analysis of Subsidence and Accretion, Sacramento-San Joaquin Delta

Steven Deverel, Ph.D., P.G., Hydrofocus Inc., Jeremy Proville, Environmental Defense Fund, Christine Schoenzart, McKinsey & Company, Belinda Morris, American Carbon Registry

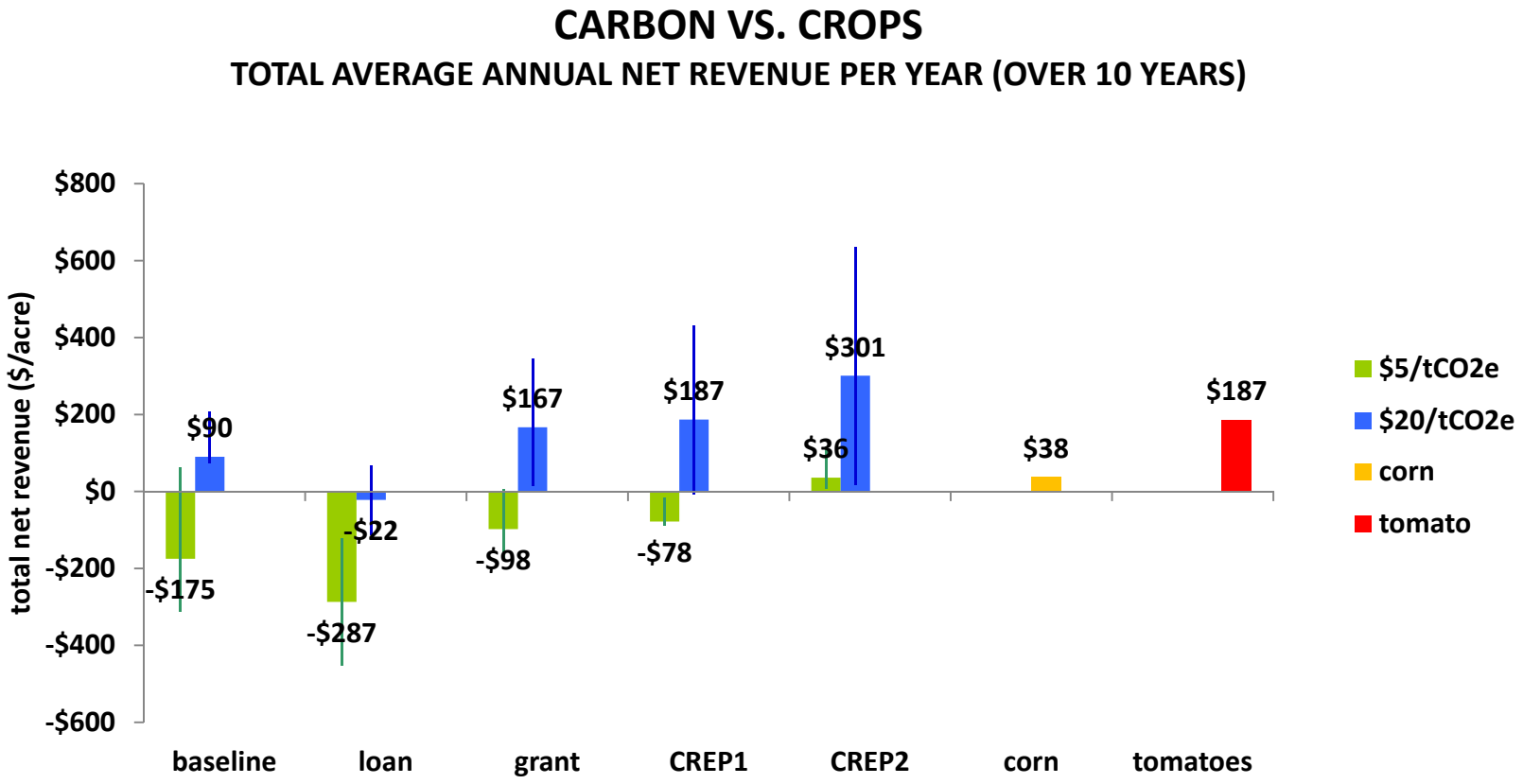
Can Carbon Alone Pay for Wetlands?

Break-even Cost of Producing Carbon with 10-year Amortization of Costs

		Wetland Cost Scenario		
		low	med	high
TOTAL CARBON CREDITS PRODUCED PER ACRE (MT CO2e) [1]				
Year 1:	Wetland construction	0	0	0
Years 2-5:	Avoided emission[2]	32	32	32
Years 2-5:	Ramping up sequestration[3]	34	34	34
Years 6+:	Full production carbon sequestration[3]	125	125	125
TOTAL CARBON PRODUCED PER ACRE OVER 10 YEARS (MT CO2e)		198	198	198
CARBON PRODUCTION COSTS PER CARBON CREDIT ($/MT CO2e) [4]		$12	$13	$17
CARBON PRODUCTION COSTS PER ACRE/YEAR		$236	$262	$336

1. Assumes zero carbon credits year 1; avoided emissions reductions begin year 2 because of emissions during construction
2. Does not account for avoided N2O emissions
3. Does not account for methane emission now estimated at +-0.5 MT CH4 (10-12 MT CO2e)
4. Carbon verification costs not included

Financial/Payment Stacking



Options for Stacking Offset Credits?

Not yet, is there potential…?

- Conversion to rice vs. wetlands
- Habitat
- Water quality
- Levy stability

Further Information

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