2018 ACES
A Community on Ecosystem Services
Natural Resources Benefitting People
Celebrating 10 years of ACES!

Industrial Process Pond/Impoundment Closures: Business-Case Opportunities to Create Ecosystem Services

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Source: Google Earth

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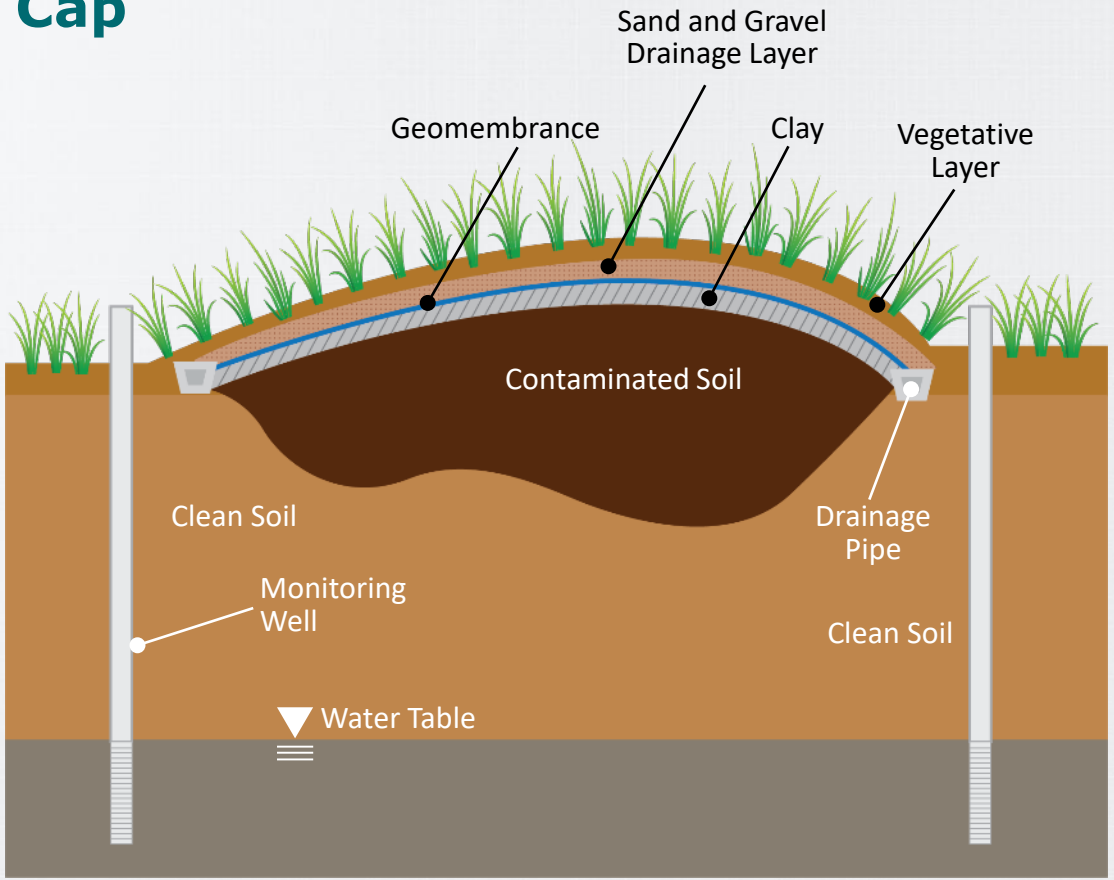
Traditional Isolation Cap

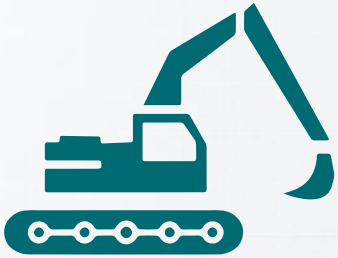
- Sheds water
- Poor growing conditions
- Limited edaphic variability
- Typically mown
- Expensive



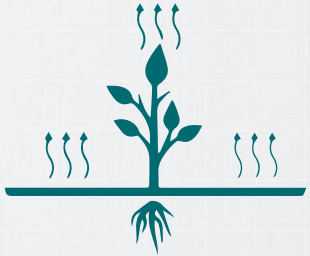
Traditional Cap on Closed Impoundment
13 Plant Species

Alternatives to Traditional Isolation Cap

No Action



Soil Cover

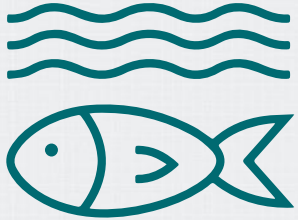


Monolithic Evapotranspiration (ET)

ET Capillary Barrier

Bioengineering Management

Asphalt Barrier

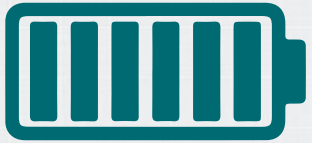


Subaqueous

Potential Benefits

Lower Cost

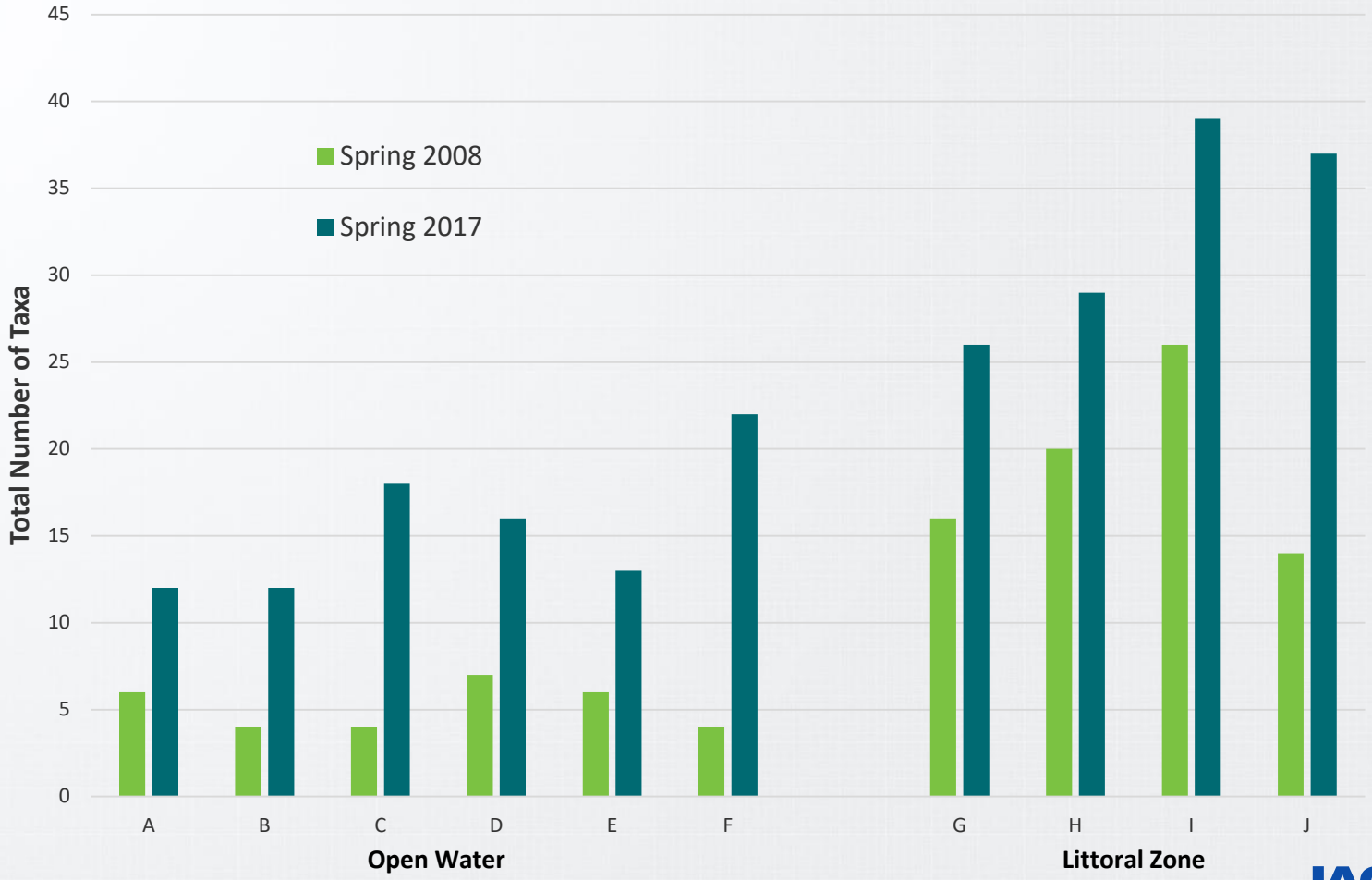
Less Maintenance



Longer Life

More Habitat Value

More Human Use Value


45
40
35
30
25
20
15
10
5
0
Total Number of Taxa
Spring 2008
Spring 2017
A
B
C
D
E
F
G
H
I
J
Open Water
Littoral Zone

Water-Associated Birds

Family	Group	Total # of Species	Migratory Only
Pandionidae	Ospreys	1	0
Anatidae	Ducks, Geese, Swans	21	19
Charadriidae	Plovers, Dotterels, Lapwings	1	0
Laridae	Gulls, Terns and Skimmers	1	1
Scolopacidae	Sandpipers, Curlews and Snipe	2	1
Alcedinidae	Kingfishers	1	0
Rallidae	Rails	1	1
Hirundinidae	Swallows, Martins	2	1
Ardeidae	Herons	3	1
Podicipedidae	Grebes	1	0
	TOTALS	34	24

Traditional Cap vs Soil Cover

13 Plant Species

28 Plant Species

Plant Species
2015 (46)
2016 (58)
2017 (74)

Types of Arthropods

- Primary Consumers
- Pollinators
- Secondary Consumers
- Detritivores

Source: Castagneyrol and Jactel, 2012

Compartments of Opportunity

Supply Chain

Footprint

Adjacent Area

Construction

Resources

Challenges

- Ecology
- Regulatory approval of alternative closures
- Concerned stakeholders
- Successful implementation of innovative/nonconventional designs


Source: Birds in the Yard


Source: USFWS


Source: Roy Wood


Source: Wikiwand

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Ecosystem Services Identification & Inventory Tool

Table 2
The ESII tool's ecosystem service measurements.
Source: The ESII Tool User's Guide, available at http://www.esiitool.com/users-guide/.

	Nature scorecard component	Measured component	Unit measurement
	(A)	(B)	(C)
(1)	Water provisioning	Water provisioning	Gallons/foot^2; Gallons/map unit
(2)	Air quality control	Nitrogen removal	Pounds/acre/year; Pounds/map unit/year
		Particulate removal	Pounds/acre/year; Pounds/map unit/year
(3)	Climate regulation	Air temperature regulation	BTU reduction shade (BTU/foot^2/hour); BTU reduction shade (BTU/map unit/hour); BTU reduction shade (BTU/foot^2/day); BTU reduction shade (BTU/map unit/day)
		Carbon uptake	No unit of measure
(4)	Erosion regulation	Erosion regulation	Acres < 35%
		Erosion regulation - mass wasting	No unit of measure
(5)	Water quality control	Nitrogen removal	Nitrogen removal - milligrams/liter; Max nitrogen removal - milligrams/liter
		Water filtration	TSS removal - milligrams/liter; Max TSS removal - milligrams/liter
(6)	Water temperature regulation	Water temperature regulation	No unit of measure
(7)	Water quantity control	Water quantity control	Water quantity runoff - inches across site; Water quantity runoff - gallons/acre; Water quantity runoff - gallons/map unit
(8)	Aesthetics	Noise	Noise attenuation - decibels
		Visual	Visual screening - acres

Source: Guertin et al., 2018

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Net Environmental Benefit Analysis

Identifies the protective options that create the greatest net environmental benefit at the lowest cost.

Ecological Services
(discounted service acre years)

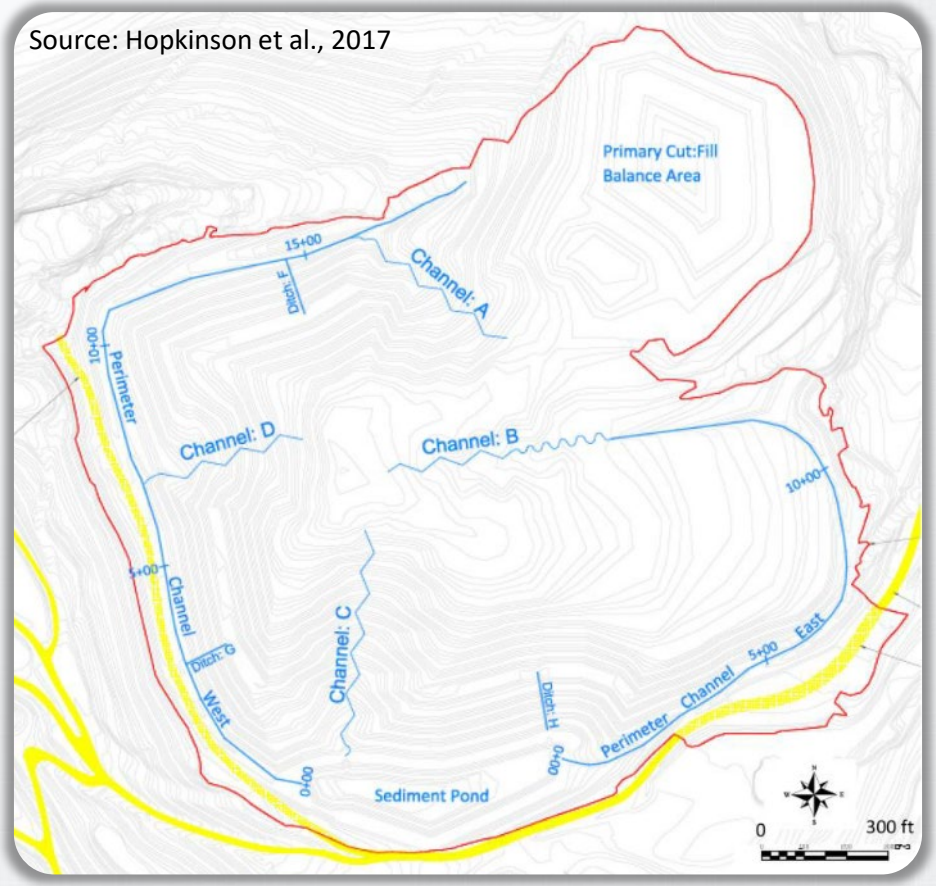
Active and Passive Human Use Services ($)

Example Output from NEBA Analysis

Closure Option	Protective?	Cost ($)	Ecological Service Value (dSAYs)	Human Use Value (NPV $)	Net dSAYs per $ Spent	Net Human Use Value per $ Spent
NO ACTION (BASELINE)	N	0	300	0	na	na
CAP	Y	2,500,000	1500	50,000	0.0005	0.02
SOIL COVER	Y	1,100,000	4000	300,000	0.003	0.27

Field Pilot Testing

Geomorphic Design



Closing Thoughts