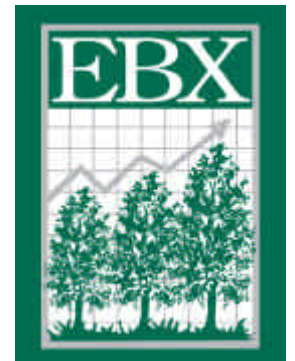


**ETN Training Workshop on
Water Quality Trading**

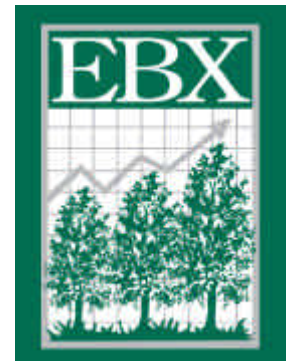
August 22, 2006

**Cincinnati Marriott at RiverCenter
Cincinnati, Ohio**



Scope of Discussion

- ✍ Non-point source / Point Source Trading
- ✍ Focus on sinks and not source reduction BMPs
- ✍ Third-party project sponsor and not broker

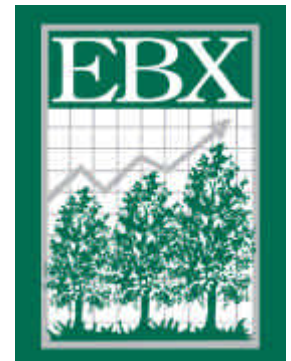


Background

- ✍ Chesapeake Bay Program Nutrient Trading Fundamental Principles and Guidelines, March 2001
- ✍ EPA Office of Water: Water Quality Trading Policy, January 2003
- ✍ Programs: Lower Boise River, Idaho; Long Island Sound, Connecticut; Tar-Pam, North Carolina; State Michigan;
- ✍ Multiple “one-off” trades: Rahr Malting, Minnesota; Dillon Creek, Colorado; etc.
- ✍ New Programs: Virginia Law (any new or expanded facilities allowed to Trade NPS); PADEP – Trading Guidance; Conestoga River, PA Pilot Program (reverse auction); Great Miami Watershed, Ohio; Draft Water Quality Rules in Ohio; Maryland Nutrient Goals

Background (cont'd)

- ✍ National Forum on Synergies Between Water Quality Trading and Wetland Mitigation Banking, July 11-12, 2005
- ✍ Role of Wetlands in Water Quality Trading, US EPA, February 14-15, 2006
- ✍ Draft Regulations on Wetland / Stream Mitigation, US ACE and US EPA, March 28, 2006

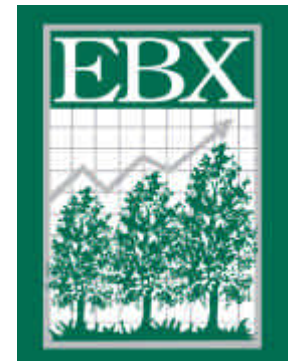


COMPARISON OF WETLAND BANKING AND WATER QUALITY TRADING

	WETLAND BANKING	WATER QUALITY TRADING
Regulatory Drivers	-404/401 Clean Water Act	- 402/CWA/State delegated Programs
	-1995 Guidance - DOD Regulations	- Trading Rules (2003) - TMDLs, Nutrient Standards
Permitted impacts	One-time	Ongoing (5-year permit)
Sale period	One-time	Yearly / Up to 5 years? Lifespan of BMP?
Banking	Authorized	Not yet authorized
Currency	Acres / functional value	Pounds of nitrogen, phosphorus, sediment, thermal
Service Area	HUC (8-digit)	Watersheds (although must be upstream of buyer)/possible Bay-wide
Pre-sale	Allowed upon approval of MBI	Not clear
Certification process of credits	MBRT/IRT (up to 3 years)	Not clear
Liability relief	Authorized by guidance to transfer	Permittee responsible unless private contractual agreement
Trading Ratios	Varies from state-to-state	Not yet clear, but include uncertainty, delivery and discount risks
Options to trade	In-lieu / permittee mitigation	Increased facility compliance or multiple BMPs
Credit release	Released over 5 years, with pre-sale	Not clear
Monitoring and maintenance	5 – 10 years	Not clear
Approval of sale	ACOE	Not clear / State? NRCS? Notification?
Credit generation	One form	Multiple forms: source reduction vs. sink credits
Pricing	Dictated by State and land prices, variable; increasing info in States	Unknown, no discovery
Types of Permits	404/401	Watershed, State, Case-by-case

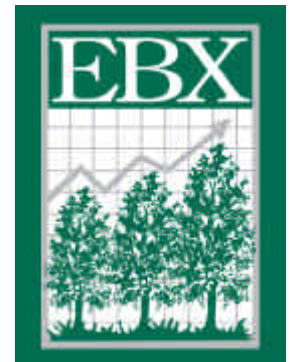
Transactional Factors / Water Quality Trading

- ✍ Market conditions
- ✍ Eligibility determination
- ✍ Baseline analysis for Seller
- ✍ Cap and allocation to buyer (unless one-time buyer)
- ✍ Credit generation (type of project, lifespan, monitoring and maintenance, financial opportunities)
- ✍ Cost differential to support trade
- ✍ Market pricing discovery
- ✍ Approval process for seller and buyer
- ✍ Duration of trades
- ✍ Structuring trading contracts
- ✍ Accounting / Registry
- ✍ Deed restrictions / covenants
- ✍ Enforcement



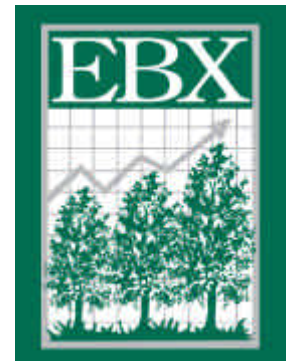
Market Conditions

- ✍ Regulatory drivers: TMDL; nutrient standards; hypoxia; growth
- ✍ Demand and Supply
- ✍ Restrictions on Trades (i.e. NPS must meet tributary strategy or PS cannot trade to meet cap, etc.)



Eligibility

- ✍ Buyer – Cannot trade technology-based effluent limitations; trade to meet or exceed cap? Permit allow?
- ✍ Seller – Credit produced if reduce loadings below that which legally required under current laws. What if law changes? What if cost-share? What if portion used for mitigation?



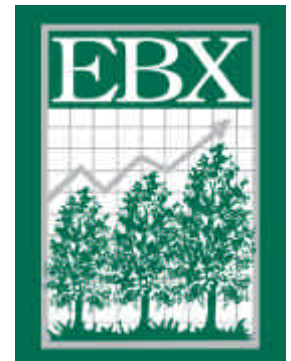
Baseline Analysis

Rules

- Default provisions for BMPs on efficiency and discounts
- Nutrient Net – WRI (customized)
- Actual field measurements
- Ratios

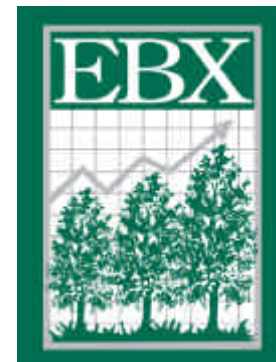
Preliminary Economics

- Price per pound x number of pounds reduced



Cap and Allocation to Buyer

- ✍ Translate effluent limitations to mass loadings
- ✍ Permit flexibility to allow trade: trade upriver of PS, watershed, general, programmatic or case-by-case
- ✍ Not trade technology-based effluent limitations, not result in nonattainment, not adversely affect water quality at drinking water intake, not exceed cap under TMDL



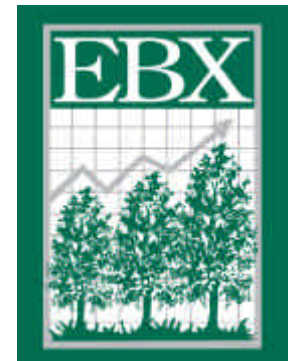
CREDIT GENERATION / NPS

Approved Agricultural BMPs

Riparian Forest or Grass Buffers
Wetland Restoration
Land Retirement and/or Tree Planting
Conservation-Tillage
Carbon Sequestration/Alternative Crops
Poultry Phytase
Poultry Litter Transport
Nutrient Management
Enhanced Nutrient Management
Conservation Plans/SCWQP
Cover Crops
Small Grain Enhancement
Off-Stream Watering w/ or w/o Fencing
Stream Fencing & Rotational Grazing
Manure Management Systems: Livestock or Poultry
Barnyard Runoff Control/Loafing Lot Management

Agricultural BMPs Requiring Peer Review

Continuous No-Till
Dairy Precision Feeding and/or Forage Management
Swine Phytase
Ammonia Emission Reductions
Precision Agriculture
Precision Grazing
Water Control Structures
Stream Restoration



* Chesapeake Bay Program

Credit Generation / NPS

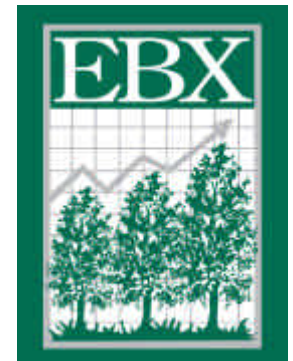
Approved Urban and Mixed Open BMPs

Riparian Forest Buffers
Wetland Restoration
Tree Planting
Urban Growth Reduction
Wet Ponds & Wetlands
Dry Detention Ponds & Hydrodynamic Structures
Dry Extended Detention Ponds
Urban Infiltration Practices
Urban Stream Restoration
Erosion & Sediment Control
Urban and Mixed Open Nutrient Management

“Urban” BMPs Requiring Peer Review

Riparian Grass Buffers
Forest Conservation
Horse Pasture Management
Abandoned Mine Reclamation
Mixed Open Stream Restoration
Dirt & Gravel Road Erosion & Sediment Control
Urban Street Sweeping

* Chesapeake Bay Program



CREDIT GENERATION / NPS

Approved Septic BMPs

Septic Connections to Sewer
Septic Pumping
Septic Denitrification

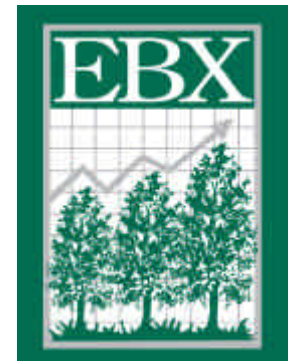
Approved Forest BMPs

Forest Harvesting
Practices

Forest BMPs Requiring Peer Review

“Non-urban” Stream
Restoration

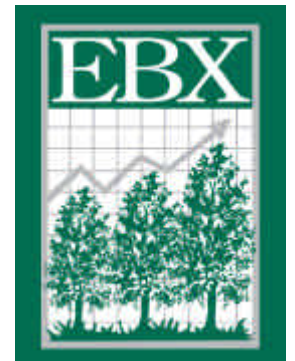
Dirt & Gravel Road
Erosion & Sediment
Control



Cost differential to Support Trade

✍ PS v. NPS costs

✍ Trading ratios: delivery, equivalency, uncertainty and/or retirement ratio

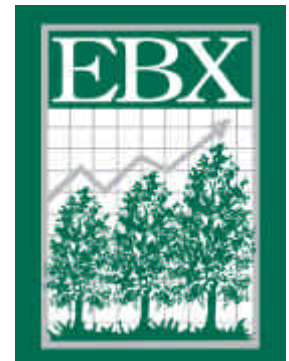


Costs and Cost-Effectiveness

* Example: Maryland WWTP

Number of Upgrades	Million Pounds of Nitrogen Reduction	Final WWTP Load Million Pounds	Incremental Reduction Million Pounds	Incremental Cost Million \$	Cost per Pound \$
9	6.5	9.0	6.5	513	79
32	8.1	7.4	1.6	161	101
67	8.3	7.2	0.2	69	345

* Cy Jones, WSSC, June 2004



BMP PRICING

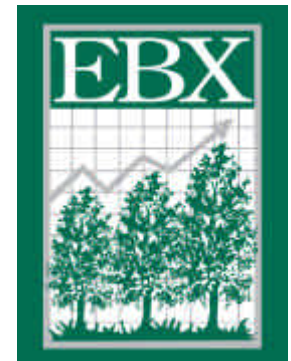
Example: Chesapeake Bay *

Annual Baywide Nutrient and Sediment Reduction Potential for the Six Most Cost-Effective Measures

MEASURES	NITROGEN		PHOSPHORUS		SEDIMENT	
	M lbs.	\$/lb.	M lbs.	\$/lb	M tons	\$/ton
1. Waste Treatment Upgrades	35.0	8.56	3.0	74.00	n/a	
2. Diet and Feed Changes	Data under dev.		0.22	0.00	n/a	
3. Nutrient Mgt	13.6	1.66	0.80	28.26	n/a	
4. Enhanced Nutrient Mgt	23.7	4.41	0.80	95.79	n/a	
5. Conservation Tillage	12.0	1.57	2.59	-----	1.68	-----
6. Cover Crops	23.3	3.13	0.44	-----	0.22	-----

n/a = not applicable ----- = no additional cost

* Chesapeake Bay Commission, Cost-Effective Strategies for the Bay, December, 2004



Watershed Unit Cost Comparisons

Ex: Great Miami Watershed, Ohio

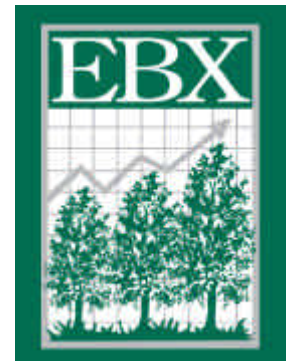
Agricultural Management Practices	Point Source Upgrade Unit Cost (/lb)	Agricultural Management Unit Cost (/lb)
No Till	\$23.37 (TP) \$4.72 (TN)	\$1.08 (TP) \$0.45 (TN)
No Till & fertilizer reduction		\$2.70 (TP) \$1.23 (TN)
No Till & fertilizer Reduction & hay only		\$8.48 (TP) \$3.99 (TN)

* Mark S. Kieser, Andrew Fang, Kieser & Associates. A preliminary analysis of water quality trading opportunities in the Great Miami River Watershed, Ohio, October 6, 2006.

Market Pricing Discovery

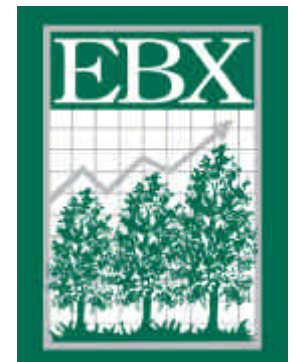
✍ Cost of BMP plus seller return parameters

✍ Cost of other supply options (How do they compare?)



Approval Process for Seller and Buyer

- ✍ Process credits generated by seller: Credit Reduction certificate, IRT? NRCS?
- ✍ Permit allows trade by buyer: Trade Notification, Reconciliation period between buyer and seller

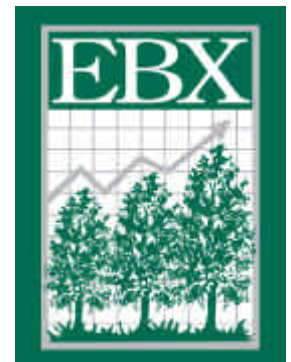


Duration of Trades

✍ Lifespan of BMP?

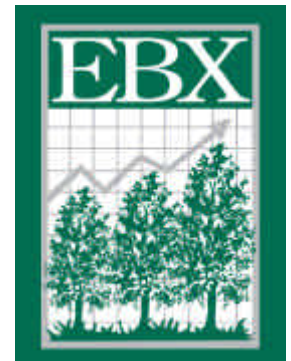
✍ Banking allowed?

✍ Permit period (i.e. 5 years)?



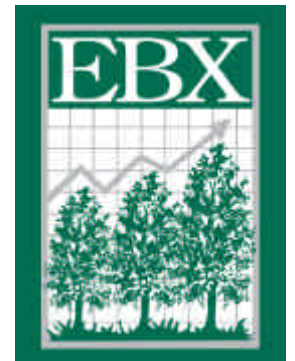
Trading Contracts

- ✍ Approval by resource agencies?
- ✍ Up front yearly payments?
- ✍ Monthly payments?
- ✍ Duration of trade?
- ✍ Price?
- ✍ Insurance for credit deficits?
- ✍ Financial assurances?
- ✍ Liability transfer / include sites or permit?
- ✍ Securities issues?
- ✍ Seasonal variability
- ✍ Monitoring and maintenance
- ✍ Adaptive management?
- ✍ Deed restrictions on land?
- ✍ Enforcement provisions?



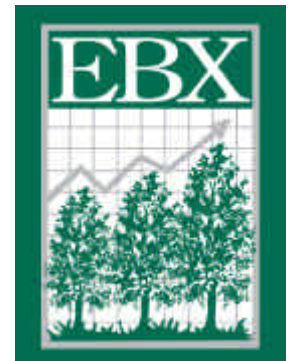
Accounting / Registry

- ✍ Trade notification reports
- ✍ Reconciliation between buyer and seller – buyer reports monthly while seller’s results are seasonal or annual
- ✍ Ledger or permit amendments
- ✍ “True up” period



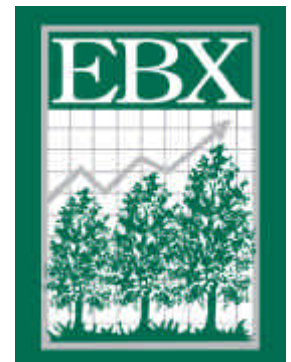
Enforcement

- ✍️ Penalty for exceeding effluent limitation on PS (ceiling on market)
- ✍️ Requirement to authorize enforcement in any trading contract
- ✍️ Seller included on permit as responsible for credits?



Deed Restrictions / Covenants

- ✍ Depending on nature of BMP
- ✍ Place easement or restrictive covenant on land for life of BMP



Example: Idaho Trading Credits Calculations

A) Baseline Load	300	Farm Acres
	15.7	SISL BSL Tons of Soil Lost Per Acre per year (BMP list)
	2	Pounds Phosphorus Per Ton of Soil Lost (BMP List)
	=Access x	SISL BSL x lbs. Of phosphorus per ton of soil
	9,420	Baseline Load (lbs. / year)
B) BMP Reduction	80%	BMP efficiency (BMP List)
	0%	Uncertainty discount (BMP List)
	80%	Total BMP impact percentage
	=Baseline	Load x Total BMP impact percentage
	7,536	Field Edge Reductions (lbs. / year)
C) Water Quality Contribution	60%	Water Quality Contribution percentage
	=Baseline	Load x Water Quality Contribution percentage
	5,652	Water Quality Contribution
	= Field Edge Reductions	- Water Quality Contributions Surplus Field Edge Reductions (lbs. / year)
	1,884	
	0.95	River location ratio for the Conway Gulch (BMP List)
	0.975	Drainage delivery ratio based on location 2.5 miles from the delivery point (BMP List)
	0.80	Site location factor for indirect flow to drain (BMP List)
D) Adjusted Reduction	= Surplus Field Edge Reductions x river location ratio x site location x drainage delivery ratio	
	1,884 x 0.95	
	1,790 x 0.975	=1,790
	1,745 x 0.80	=1,745
	1,396	=1,396
		Tradable Credits (lbs. / year)

Role of Third Party / Project Sponsor

- ✍ Baseline analysis for seller
- ✍ Interface between buyer and seller
- ✍ Market analysis on viability of projects
- ✍ Implementator and guarantor
- ✍ Negotiate contracts with buyer
- ✍ Interface with resource agencies
- ✍ Interface with landowners
- ✍ Capital provider

