

Outline

- Valuation of Wetlands
 - What services do wetlands provide?
 - What is ecosystem or wetland service valuation?
 - Examples of Wetland Service Valuations
- How does wetland value tie into management?

OCC partnerships and recent, current, and future projects

Wetland Statistics

- State acreage = 44,735,821
- Original Wetland Acreage = 2,842,600
- Remaining Wetland Acreage = 949,700
 - About 2% of total land area
- Acreage Lost = 1,892,900
- % Lost = 67%
- Most wetlands in Oklahoma are palustrine
 - Freshwater wetlands that lack flow

Four categories of ecosystem services

- 1) Regulating (water quality, flood protection, etc.)
- 2) Provisioning (food, water, building materials)
- 3) Supporting (soil formation, nutrient cycling)
- 4) Cultural (spiritual, recreational, scientific, aesthetic, education)

Millennium Ecosystem Assessment (2005). *Ecosystems and human well-being: synthesis*. Washington, DC: Island Press.

Services

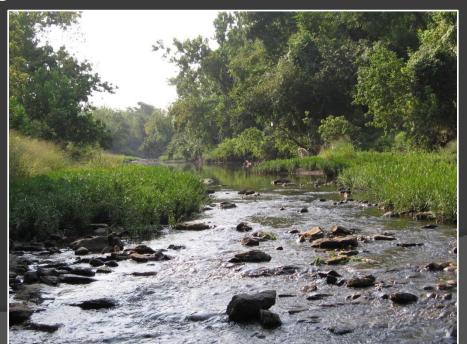
- Quality of Life
- Flood Protection
- Erosion Control
- Groundwater Recharge
- Maintenance of Streamflow
- Water Quality Improvement
- Fish and Wildlife Habitat
- Education
- Economic





Maintenance of Streamflow

- By shallow groundwater discharge to streams
- By aquifer recharge and subsequent discharge to streams
- By slowing runoff that enters streams



Water QualityImprovement

- "Kidneys of the landscape"
 - Physical settling due to long retention times
 - Nutrient enriched sediment
 - Sediment with pesticides
 - Metals
 - Uptake by hydrophytic vegetation
 - Microbial action



- Nutrient removal
 - 70%-90% nitrogen
 - 45% mean retention of phosphorus
- Biological Oxygen Demand
- Suspended solids and associated pollutants
 - 80-90% of sediment from runoff
 - Associated pollutants adsorbed to suspended solids
 - Nutrients, organics, metals, and radionuclides
- 20-100% of metals
 - Depends on metal and wetland
- Pathogens

- Wildlife Habitat
 - Microscopic to large mammals
 - Invertebrates
 - Amphibians
 - Migratory birds
 - Obligatory mammals (beaver, muskrat, otter)
 - Non-obligatory (rabbit, deer, raccoon))
 - Biological diversity and landscape stability

Although wetlands comprise 3.5-6% of U.S. land, more than 1/3 of the T&E species live only in wetlands.







Education

- Living, outdoor classrooms
 - Unique plant and animal species
 - Ecological principles
 - Energy flow
 - Nutrient recycling
 - Carrying capacity
- Spark an interest in the "real" world of science
 - "Tell me and I forget, teach me and I remember, involve me and I learn".

Benjamin Franklin

Established Benefits/Services

- Quality of Life
- Flood Protection
- Erosion Control
- Groundwater Recharge
- Maintenance of Streamflow
- Water Quality Improvement
- Fish and Wildlife Habitat
- Education
- Economic



• Economic

- Goods = Natural products (timber, fish, shellfish, cranberries, wild rice)
- Recreation
 - Fishing
 - Hunting
 - Non-consumptive (birdwatching, hiking)
- Flood protection
- Water quality improvement
- Erosion control
- Groundwater recharge

Value of Wetlands

- Valuation the process of estimating what something is worth either financially or otherwise
- Value = monetary worth
- Value = degree of importance in ethics
- Value = Ecological Function the ability of specific functions to perform & the ecological value of their contribution to the overall health of the ecosystem
- Benefit = Goods (tangible) and/or Services (intangible)

In simple terms, wetland valuation is used to estimate the ecological, socio-cultural and/or economic values of the services a wetland ecosystem provides for society.

Valuation of Wetlands

Four types of values can be assigned to ecosystems

- 1) <u>Direct Use Value</u> actual use of a good or service (fishing, hunting, birdwatching)
- 2) Indirect Use Value (wildlife show, fishery -fish recruitment for continuous or adjacent waters)
- 3) Option Value preserving the option for future use
- 4) Non-use Value attributed to the welfare the ecosystem may give other people or future generations, or existence value

Valuation

Market-based

Market price – reflects the value to the "marginal buyer"

Productivity

Productivity Method – income benefit of service verses the cost of protecting/restoring service

Revealed Preference

Avoided Cost/Replacement Cost/Substitution Cost

Travel Cost – cost of travel required to consume or enjoy ecosystem services

Hedonic Pricing – the reflection of service demand in the prices people will pay for associated goods

Stated Preference

Contingent Valuation – value for service demand elicited by posing hypothetical scenarios that involve some valuation of land-use alternatives

Conjoint Analysis – Allows respondents to think in terms of tradeoffs

Benefit Transfer

Benefit Transfer – transfer of study findings to new study areas

Association of State Wetland Managers

- In context of restoration cost/benefit or return on investment
- Explains the concept of ecosystem service valuation and natural capital
- Provides some historical context for efforts to develop measures of wetland function, benefits, and their value to society within U.S. policy
- Connects the use of ecosystem service valuation to contemporary concerns and issues
- Explains the valuation process and some of the most commonly used methods
 - Illustrates advantages and disadvantages of each approach
- Provides summaries of five wetland valuation case studies
- Outlines best practice recommendations
- Includes available decision support tools, methods, and software

^{*}Stelk, M.J. & Christie, J. (2014). Ecosystem Service Valuation for Wetlands Restoration: What It Is, How To DO It, and Best Practice Recommendations. Association of State Wetland Managers, Windham, Maine

- "Valuing Wetlands: Guidance for valuing the benefits derived from wetland ecosystem services" published by The Ramsar Convention (de Groot, Stuip, Finlayson, & Davidson, 2006)
- "An integrated Wetland Assessment Toolkit: A guide to good practice," published by the International Union for Conservation of Nature (IUCN) Species Programme (Springate-Baginski et al., 2009)
- Valuing the Protection of Ecological Systems and Services," published by the U.S. EPA (EPA Scientific Advisory Board, 2009)

^{*}All 3 reports include seven steps for a comprehensive decision-making process which includes the actual valuation

- Wetland Ecosystem Services in Delaware (2007)
 - Analyzed the change in delivery of ecosystem services associated with declines in wetlands over time
 - Used Integration Valuation of Ecosystem Services and Tradeoffs (InVEST) – a spatially-explicit modeling tool

- Demonstrated: 1) loss in carbon storage (194,417 metric tons)
 - 2) increase in nitrogen delivered to waterways
 - 3) increase in phosphorus delivered to waterways
 - 4) increase in sediment delivered to waterways
 - = increased municipal water treatment costs
 - 5) increase in flood height and area
 - = increased damage (\$) to residential structures
 - 6) direct habitat loss and increased habitat reduction
 - = economic loss from fishing, hunting, and wildlife viewing

http://www.dnrec.delaware.gov/Admin/DelawareWetlands/Documents/Economic%20Evaluat ion%20of%20Wetland%20Ecosystem%20Services%20in%20Delaware.pdf

- Lents Project Case Study, Oregon (2004)
 - Enhanced wetlands and floodplains in a redevelopment setting
 - Gross benefits accrued over 100 years totaled \$31,274,639
 - Flood Abatement: \$14,694,387
 - Biodiversity Maintenance: \$5,706,064
 - Air Quality Improvement: \$2,544,635
 - Water Quality Improvement: \$2,388,982
 - Cultural Services: \$5,940,571

http://www.portlandoregon.gov/bes/article/386288

Common Questions/Statements About Wetlands

- Why are wetlands important?
- Why should we care about wetlands?
- Are wetlands really worth the effort?
- Wetlands are only good for producing mosquitoes and snakes!
- Wetlands get in the way of the good use of my land.
- I'm tired of hunters and bunny huggers telling me we need more wetlands!

Oklahoma Wetlands Management

Restoration

- 319 NPS Program
 - 2013 OCC Project: Method Development to Incorporate Wetland Resources in Watershed Planning Efforts in Oklahoma
 - WRAP assessment methodology to identify, inventory, and rank potential wetland restoration sites
 - Applied in the N. Canadian River watershed, Lake Thunderbird watershed, and Horse Creek watershed of Grand Lake.
 - To be included in wetland registry
 - To be "marketed" to restoration programs
 - USDA NRCS Wetland Reserve Easement Program
 - USFWS Partners for Fish and Wildlife
 - To be "marketed" to mitigation programs
 - USACE "customers"
 - ODOT

Restoration

- 2014 OCC Project: Restorable Wetlands Database and Web Application Development
 - Intended to connect those with restoration needs with those who can provide restoration or who need mitigation sites
 - Restorable wetlands database framework
 - Database link and feedback mechanism to the Oklahoma Wetland Website
 - Real-time database includes potentially restorable wetland and stream sites

Historical Wetland Trends

- 2015 OCC/OSU Project: Using Wetland Mapping to Guide Restoration Decisions and Determine Wetland Trends
 - Wetland mapping (revised NWI maps) and web hosting of 2-3 high priority watersheds
 - Apply the WRAP tool
 - Develop an assessment methodology to identify historic wetland gains/losses
 - Determine types of wetland gains/losses and causes for loss
 - Apply tool to 2-3 priority watersheds
 - Information will be incorporated into 319 (NPS) planning

Mitigation

- 2015 OCC Project: Identifying Oklahoma Department of Transportation Mitigation Needs and Linking Needs with Opportunity at the Watershed Scale.
 - Joint partnership with ODOT
 - Determine current mitigation needs (service areas, resource types, acreage, etc.)
 - Determine future mitigation needs (service areas, resource types, acreage, etc.)
 - Assist in finding potentially restorable locations
 - Assist with mitigation as needed and agreed

Mitigation

- Oklahoma Rapid Assessment for Wetlands (OKRAM) — stressor based rapid assessment method
 - Joint effort involving several groups
 - OSU, Conservation Commission, OWRB, ODEQ, USACE
 - OKRAM undergoing continued testing and revision
 - Primary intended uses include:
 - Pre- and post- restoration monitoring
 - Pre- and post- mitigation monitoring

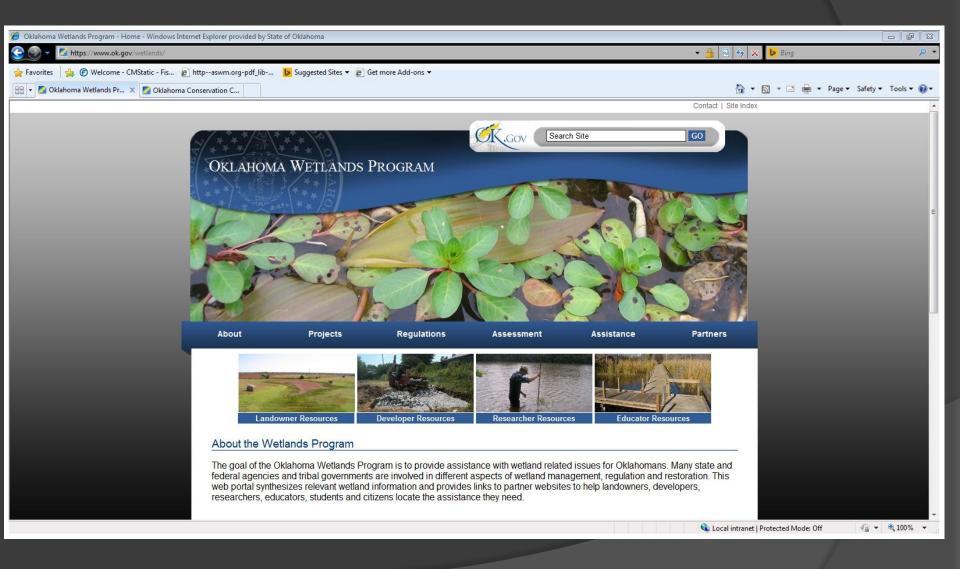
Future Projects

- Continued updates/revisions to the NWI maps
- Continued testing/revision of the OKRAM in all wetland types and regions
- Continued application of the WRAP
- Continue to develop assessment capabilities
- Continue to develop restoration capabilities

Summary

- Wetlands are important to everyone for the services they provide
- We need to share information on the importance of wetlands
- Wetland management depends on the acceptance of wetlands as important land features
- All wetland projects of OCC are building capacity for restoration and mitigation

www.wetlands.ok.gov



THANKS

Brooks Tramell

brooks.tramell@conservation.ok.gov

Office Phone: 405-522-6908

