

**Bringing Together Science and
Policy to Protect and Enhance
Wetland Ecosystem Services in
Agricultural Landscapes: Results
of the OECD Workshop**

Richard Lowrance, Chris Tanner,
Clive Howard-Williams, & Mark Tomer

Outline

- Summarize the symposium (sponsored by Organization for Economic Cooperation and Development – Biological Resource Management for Sustainable Agricultural Systems Co-operative Research Program) – September, 2011, Rotorua, New Zealand (IWA DIPCON).
- General and specific findings
- Examples from the United States

WETLAND ECOSYSTEM SERVICES SYMPOSIUM PROGRAMME

Session/ Speaker#	Topic / Presenter	Time/Duration
	Welcome And Workshop Introduction	9:00am (10 min)
	Gary Fitt (Australia) Introduction to the OECD Co-operative Research Programme: Biological Resource Management for Sustainable Agricultural Systems.	9.10am (15 min)
Session A	Wetland Ecology And Biodiversity In Agricultural Landscapes (Moderator: Chris Tanner, Niwa)	
1	Jos Verhoeven (Netherlands) Wetlands in agricultural landscapes: how to combine nutrient retention and biodiversity	9:25am (25 min)
2	Mark Tomer (USA) Factors impacting nitrate-N removal by wetlands placed using lidar topographic data: a watershed-scale modeling exercise	9:50am (25 min)
3	John Strand (Sweden) Combating coastal eutrophication and enhancing the biodiversity of agricultural landscapes: experiences from wetland creation in Sweden	10:15am (25 min)
4	George Lukacs (Australia) Role of artificial wetlands in irrigated agricultural landscapes: an Australian perspective.	10:40am (25 min)
5	Bruna Gumiero (Italy) Integrating riparian wetland and river restoration in Europe	11:05am (25 min)
Discussion Session	What level of agricultural intensity and impacts can wetlands realistically mitigate? (Facilitator: Clive Howard-Williams)	11:30am (30 min)



Session B	Ecosystem Services Provided By Wetlands In Agricultural Landscapes (Moderator: Mark Tomer)	
6	Peter Groffman (USA) Wetland ecosystem services in agricultural landscapes	1:00pm (25 min)
7	Yoshihiro Natuhara (Japan) Provision of ecosystem services by paddy fields as surrogates of natural wetlands	1:25pm (25 min)
8	Richard Lowrance (USA) Wetland ecosystem services from USDA conservation practices	1:50pm (25 min)
9	Chris Tanner (New Zealand) Location, location, location – where in agricultural landscapes will wetlands provide the greatest nutrient attenuation?	2:15pm (25 min)
10	Julien Tournebize (France) Pesticide de-contamination of surface-waters as a wetland ecosystem service in agricultural landscapes	2:40pm (25 min)
	AFTERNOON TEA	3:05pm (25 min)

	AFTERNOON TEA	3.05pm (25 min)
Session C	Policy Approaches To Promote Wetland Ecosystem Services. (Moderator: Richard Lowrance)	
11	Edward Maltby (UK) The challenges and implications of linking wetland science to policy in Europe -experience from the UK national ecosystem assessment	3:30pm (25 min)
12	Shona Myers, Bev Clarkson and Paula Reeves (New Zealand) Turning the tide – are current New Zealand approaches and policies sustaining Wetland ecosystems in agricultural landscapes?	3:55pm (25 min)
13	Luke Brander (Netherlands) The economic value of wetlands in agricultural landscapes: a meta-analysis	4:20pm (25 min)
Discussion session	What policy approaches can best promote wetland ecosystem services in agricultural landscapes, and what science is needed to support them? (Facilitator: Clive Howard-Williams)	4:45pm (30 min)
	Wrap-Up (Chris Tanner) Outcomes of the symposium and where to from here	5:15pm (15 min)



General Findings

- There is continuing cumulative loss of wetland over most of the world with little monitoring at regional or national scales.
- There are highly varied policies, rules and approaches between and often within nations. These reflect the specific history, issues and policy environment of the countries involved. There is unlikely to be one ideal approach relevant to all countries.

General Findings

- Rapid land-use change means that policy responses are lagging well behind. Further reduction of agricultural subsidies being considered by some countries in the light of the difficult present economic conditions may result in the loss of “carrots” that are currently being used as policy tools to promote wetland conservation and rehabilitation

General Findings

- Legal protection alone is not enough. Because wetlands in agricultural landscapes are largely managed by farmers and private land owners, engagement and education is essential to make legal frameworks effective. Voluntary and industry-led approaches involving all stakeholders are important ways to initiate dialogue and promote proactive engagement.

General Findings

- Policies relating to international treaties (e.g. Rio Convention and the Ramsar Convention) are often in place. Such treaties tend to focus on larger wetlands. The challenge is to achieve national or regional policies and rules that will cover the protection, maintenance and even enhancement of smaller wetlands dispersed across agricultural landscapes. These small wetlands are generally not protected under current policies.

General Findings

- The term “wetland” includes a highly diverse range of ecosystems with different characteristics. Boundary delineation and the linkages between wetlands and their catchments is a significant issue for regulators. Current policies often refer to ‘significant’ ecosystems for protection. There is ongoing debate on what constitutes ‘significance’.

General Findings

- Policies need to change from what wetlands are to what wetlands can do. This will require recognition of ecosystem services in a policy setting. This is made complex by different wetlands in different parts of the landscape having different functions.

General Findings

- One example - The UK National Ecosystem Assessment has adopted a conceptual framework to define ecosystem services for managers. This involves defining : Processes; Functions and Services; and linking these to human benefits such as health, safe drinking water, employment, recreation etc.

General Findings

- Enduring policy issues affecting wetlands are a lack of tools to effect policy and a lack of mechanisms to bridge the gaps between environment, social and economic outcomes.

General Findings

- A paradigm shift to force wetlands and agriculture into the same policy framework will lead to preservation and enhancement of wetland functions.

General Findings

- Co-ordinated and strategic protection, creation and enhancement of wetlands is likely to provide improved ecosystem service outcomes compared to ad-hoc approaches based on voluntary farmer participation in conservation programmes.

Discussion topics

- Discussion 1: **What level of agricultural intensity and impacts can wetlands realistically mitigate?**
- Discussion 2: **What policy approaches can best support wetland ecosystem services in agricultural landscapes and what science is needed to support them?**

What level of agricultural intensity and impacts can wetlands realistically mitigate? – Key constraints

1. Wetlands perform a number of valued and quantifiable ecosystem services and functions in agricultural landscapes.
2. Farmers wish to minimize the loss of productive land on farms (and therefore may wish to minimize the areas allocated to wetland protection or enhancement).

What level of agricultural intensity and impacts can wetlands realistically mitigate?

- We need to better link the ecosystem services that we consider important. The functions of the wetland need to be linked back to the relationship with land use and agriculture. To maintain ecosystem services, farming has to be involved. Economics are real – ecosystem services need to be paid for – this is a relatively new idea.

What level of agricultural intensity and impacts can wetlands realistically mitigate?

- We need to have a clear idea of what we expect the wetland to do – e.g. what contaminant removal do we want to see? Pesticides? phosphorus?, nitrogen?, sediment? The wetland should be designed/managed to suit the function.

What level of agricultural intensity and impacts can wetlands realistically mitigate?

- Time did not permit a full discussion of a range of ecosystem services so as an illustrative example of an approach to this question we focused initially on sediment (and associated phosphorus) retention as a service and asked the question: What factors will enhance sediment retention?

What level of agricultural intensity and impacts can wetlands realistically mitigate?

Wetland design

- Wetlands work well for removal of P and sediment in low flow. In high flows, everything that has been retained over the preceding low flow period may be re-mobilized. We need to carefully consider wetland design. Are they likely to fail (especially in high flows)? Decisions need to be made about what size/return period of flood is acceptable, and/or whether floods are required to go through the wetland or can they be routed around it.

What level of agricultural intensity and impacts can wetlands realistically mitigate?

- Wetlands should be designed according to the type of agriculture. In a cropping system there will be a lot of sediment loss, meaning a lot of sediment and phosphorus storage in the wetland. In pasture/grassland systems, there will be more dissolved nutrients and less sediment.

What policy approaches can best promote wetland ecosystem services in agricultural landscapes and what science is needed to support them?

- Need for evidence-based science to support policy initiatives in this area.
- Voluntary vs. regulatory approaches

What policy approaches can best promote wetland ecosystem services in agricultural landscapes and what science is needed to support them?

- *Voluntary approaches include*
 - 1. Those led by industry where an industry imposes penalties for non-compliance with agreed environmental initiatives (e.g. wetland protection along rivers);
 - 2. Audited self-management where community (farmer-led) groups agree on a target for (e.g.) pollution reduction through wetland enhancement;
 - 3. Information and education packages through field days, extension work etc;
 - 4. Co-operative vision amongst stakeholders.

What policy approaches can best promote wetland ecosystem services in agricultural landscapes and what science is needed to support them?

- **Voluntary approaches:** The role of the private sector in assisting farmers to protect the environment can be effective. If improved property values result from wetland protection this would be a significant stimulus.

What Policy approaches can best promote wetland ecosystem services in agricultural landscapes and what science is needed to support them?

- *Regulatory approaches include:*
- Positive instruments: Subsidies for wetland protection/enhancement, mandating wetland protection in various forms (e.g. prohibiting livestock from waterways, protecting riparian buffers) and property-tax exemption.
- Negative instruments include penalties for wetland destruction.

What Policy approaches can best promote wetland ecosystem services in agricultural landscapes and what science is needed to support them?

- **Regulatory approaches** must be reflected in a country's legislation. Direct farm subsidies are being reduced so what effect does this have on wetland protection? Many countries do not provide subsidies for farmers.

What Policy approaches can best promote wetland ecosystem services in agricultural landscapes and what science is needed to support them?

- **Regulatory approaches** include standards, targets and limits for pollutants that may be influenced positively (e.g. generation of methyl-Hg) or negatively (attenuation of NO₃ by denitrification) in wetlands. National examples are: Total maximum daily loads in the USA to protect water bodies; Nitrate directive in the European Water Framework Directive.

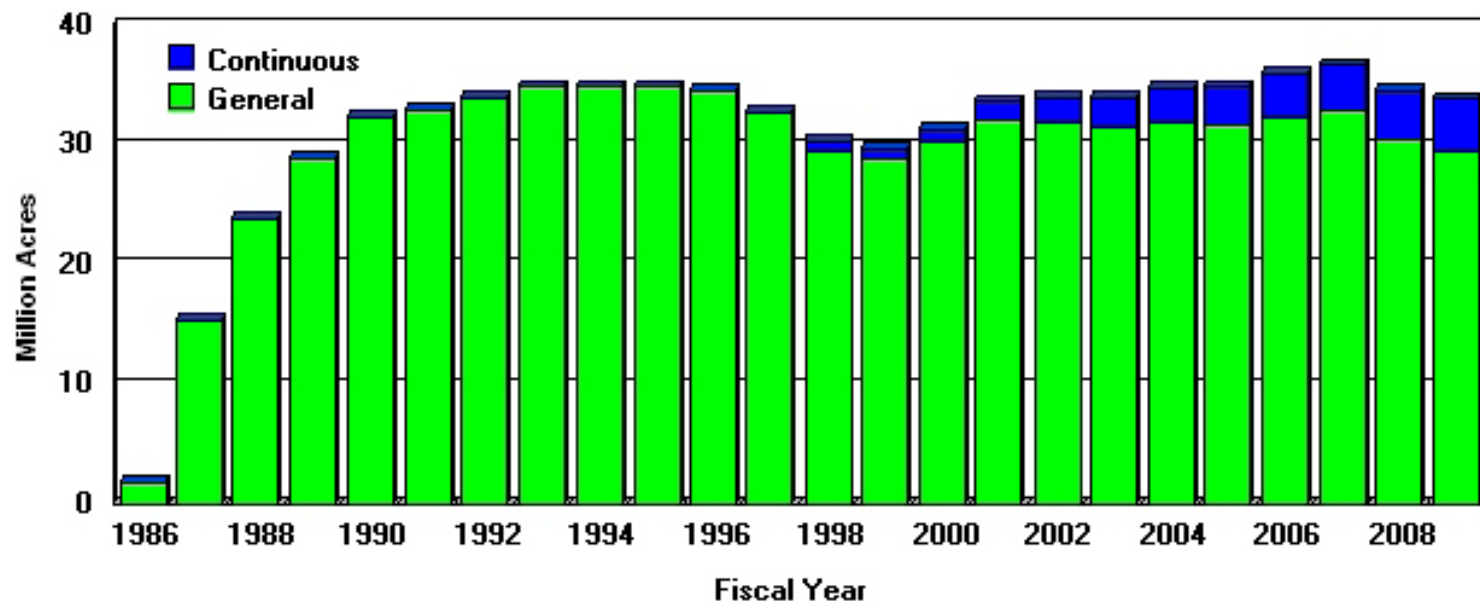
Subsidies for wetlands in agricultural landscapes - U.S. Examples



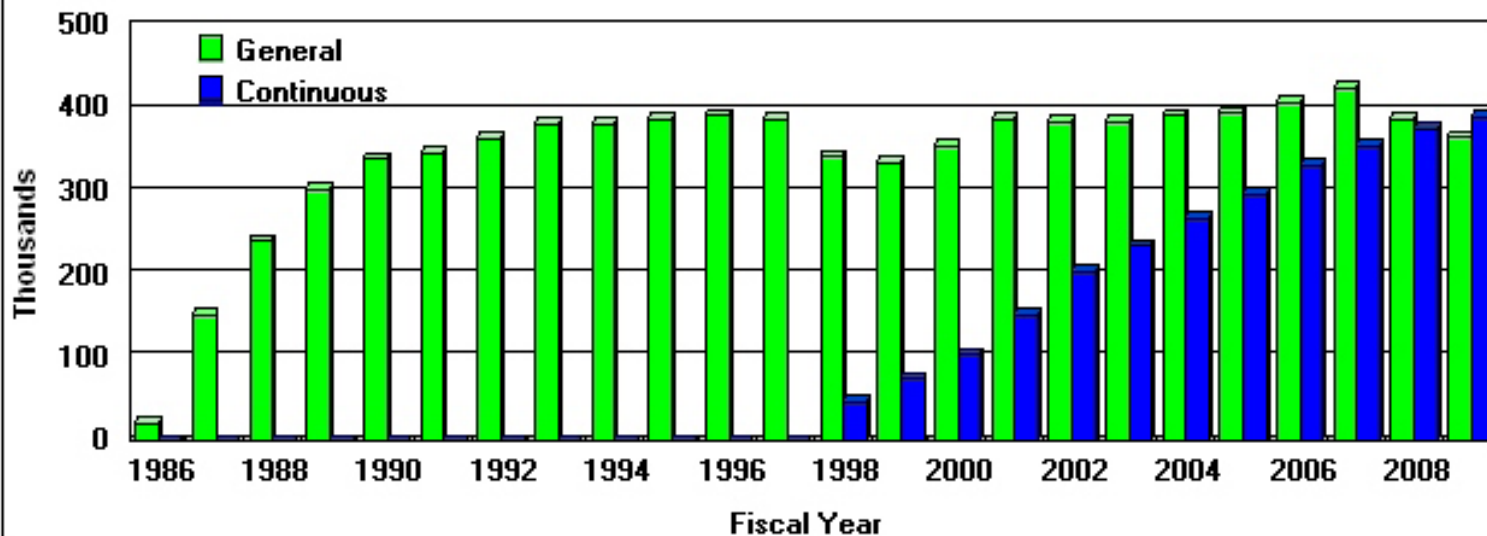
Wetland Reserve Program, FL

Program	Total Area (Million ha)	Financial Incentives	Contract period (yr)
Conservation Reserve Program (CRP)	12.9	annual rents plus cost share	10-15
Continuous - Conservation Reserve Enhancement Program (CREP)	2.1	annual rents plus cost share	10-15
Wetland Reserve Program (WRP)	1.2	cost share (10-yr contract)/one-time easement payment plus cost share	10, 30, or permanent
Environmental Quality Incentives Program (EQIP)	3.1	cost share	1-10
Wildlife Habitat Incentives Program (WHIP)	0.4	cost share	1-20 or more

CRP Enrollment at End of Each Fiscal Year (Acres)



CRP Contracts at End of Each Fiscal Year (Number)



Wetland Specific Programs*	Total Area (ha)	Per Cent of Cropland Base (158 Million ha)
CRP & CREP Conservation Buffers	816,000	0.5
CRP & CREP Wetland Restoration	896,000	0.6
Wetland Reserve Program	1,231,000	0.8
Total	2,943,000	1.9

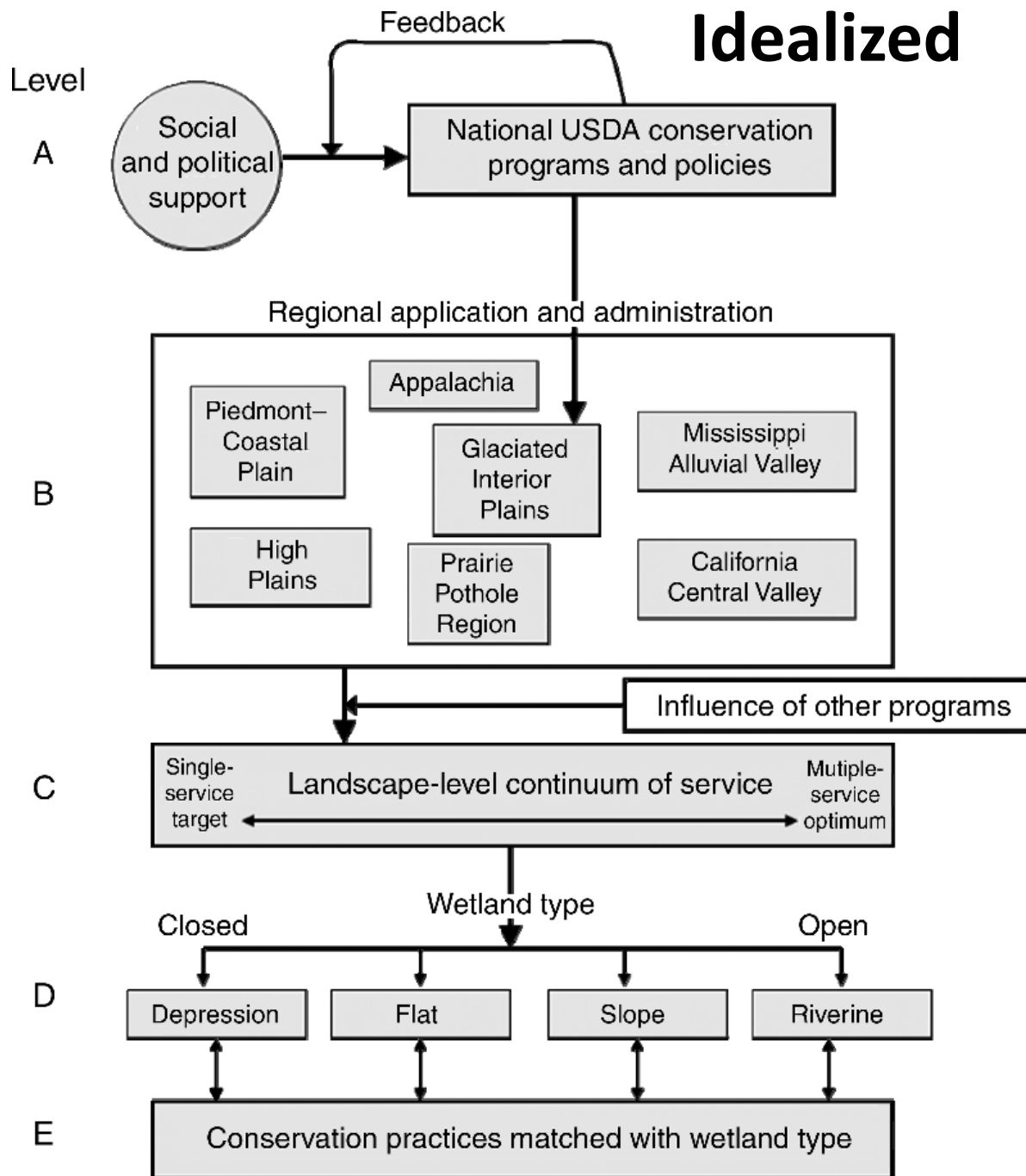
•Figures as of 2010. Practices applied in all programs include non wetland areas

Are USDA programs creating Ecosystem Service benefits and can the system be improved?



Wetland Reserve Program, FL

Idealized



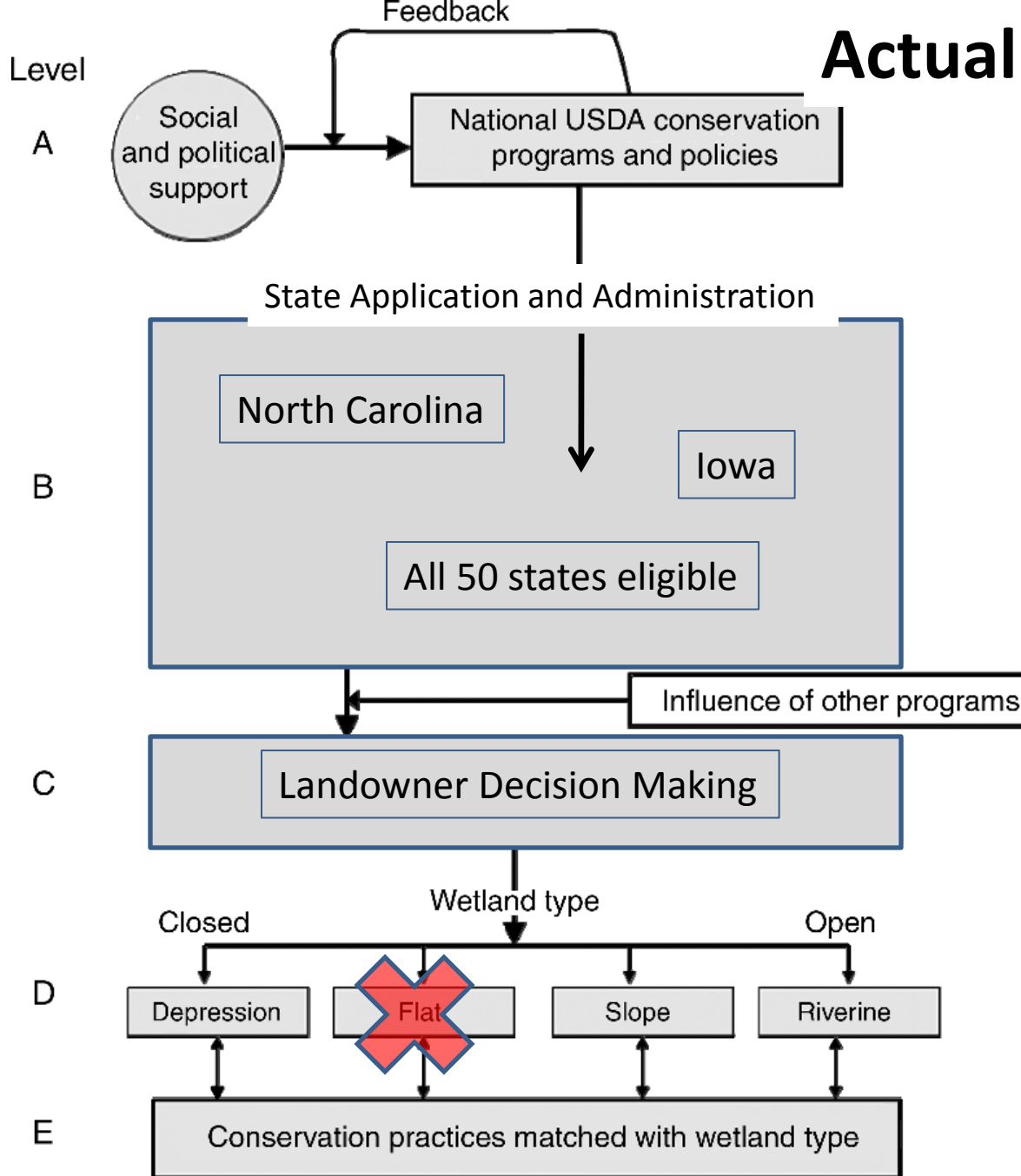
A) National program supported by society

B) Regional application of programs

C) Landscape-level application of practices targets ecosystem services

D) Wetland types range from relatively closed to open

E) conservation practices are applied to various wetland types in a geographic region. **(from Brinson & Eckles, 2011)**



- A) National program supported by society
- B) Programs carried out in partnership with states and by state offices of USDA
- Regional goals must be met through state centric programs
- C) Landowner decision making on farm by farm basis
- D) Wetland types will generally be the least productive prior converted wetlands
- (E) Conservation practices have so far focused on wildlife more than pollutants

Summary - Positive

- Great progress in reducing loss of wetlands to agriculture
- Substantial expenditures by USDA programs have enhanced or restored approx 3 Million ha of wetlands and associated lands
- Good documentation of what has been applied and potential for ecosystem services
- Some states making great strides ex: North Carolina, Iowa

Summary – Negative

- Although regional problems are recognized, addressing them with USDA wetland conservation practices & programs are in early stages – e.g. Mississippi River Basin initiative.
- Federal programs must depend on state cooperation in order to effectively target problems
- Some states are not involved due to lack of state funding and/or private funding
- Landowners (essential partners) may have confusion over large number of USDA programs.