Linking the Present to the Future - Using Environmental Expenditures to Improve Restoration Decisions

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Background

- Insights and information on which to base budgetary requests and to judge program effectiveness can be gained from identifying, or extracting costs for particular resources or programs from the total budget outlays.
- However, data calls for costs estimates are sometimes not taken seriously, received skeptically, or given short shrift when the effort requires extracting item costs from total planning or operations budgets for such things as labor, chemicals, coordination, construction, or maintenance efforts. There are numerous reasons for this.
- Expenditures that are incomplete, inaccurate, or unrepresentative are not acceptable because they can result in:
  - Inaccurate Portrayal - either excessive or minimal - of agency efforts and effectiveness, or
  - Changes in agency missions, programs, and goals based on the inaccurate

Past Corps of Engineers Expenditure Data Calls

- Wetland Creation and Restoration
- Threatened and Endangered Species
- Water Quality
- Aquatic Plants Management
- Invasive Species

The Pallid Sturgeon *(Scaphirhynchus albus)*, feeds near the river bottoms of large, muddy inland rivers. Corps costs for protective measures have ranged from $17M to $54M annually as part of inland navigation projects. (Photo: US Fish and Wildlife)

Costs Templates for Expenditures for Threatened and Endangered Species (TES) and Invasive Species

Threatened & Endangered Species Expenditures Reporting - Costs Template

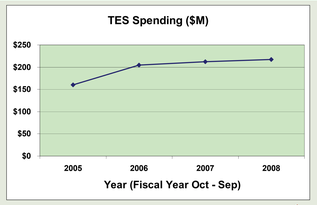
Costs Template for Threatened and Endangered Species (TES) FY08 Reporting

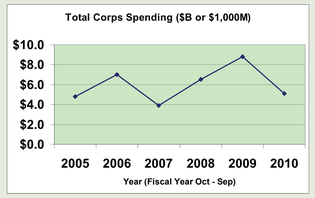
Invasive Species Expenditures Reporting - Costs Template

Costs Template for Invasive Species (IS) FY08 Reporting

To improve accuracy of expenditure reporting, and the quality of decision-making, the Corps of Engineers (Corps) initiated two automated systems to improve expenditure reports for Threatened and Endangered Species (TES) and for Invasive Species.

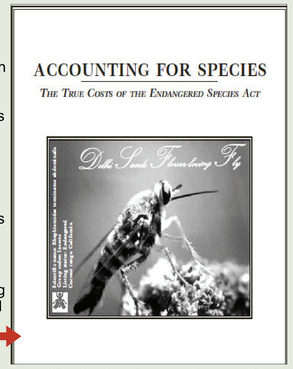
Threatened and Endangered Species (TES) Expenditures and Costs Template





Impetus to Improve TES Expenditure Reporting

- TES expenditures result from compliance with the Endangered Species Act (ESA). The expenditures required to implement the compliance actions are agency commitments so that navigation, flood protection, and ecosystem restoration programs can continue to operate in compliance with ESA.
- TES expenditures increase while total Corps funding fluctuates
  - TES costs requirements could limit Corps projects, with declining budgets
- 2004 Think-Tank Book, pointing out agency underreporting and incompleteness in TES expenditure reporting
- Scrutiny of Administration (Congress, Office of Management and Budget) on Corps estimates of future project costs and TES requirements



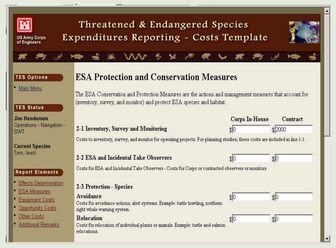
2008 Corps Costs for Reporting Groups (Kingdoms)			
	Expenditures	Litigation[1]	Land[2]
Fishes	$170,215,923	$137,579	$17,140,000
Birds	$14,561,568	$20,800	$192,000
Mammals	$1,712,290		
Insects	$3,537,163	$400	$740,000
Reptiles	$3,687,608		
Flowering Plants	$532,943		
Amphibians	$207,626		
Clams (Mussels)	$1,591,786		
Crustaceans	$198,600		
Snails	$12,632		
Lichens	$4,510		
Arachnids	$3,600		
Conifers	$150		
Ferns	$1,183		
Corals	$33,322		

[1] Litigation costs were not required to be reported for 2008.
[2] Land, acquired for TES, reported separately from species expenditures

Valley Elderberry Longhorn Beetle (*Desmocerus californicus dimorphus*)

In 2008, the Corps' Sacramento District spent $4.2M on this insect, whose protected habitat is limited to CA. (Photo:CA Acad. of Sciences)

Threatened and Endangered Species (TES) Costs Template



The Cost Template Enabled Expenditure Reporting and Analysis to Identify:

- **Magnitude of species expenditures**
- **Differences in costs between Corps functional areas, Planning versus Operations**
- **Differences in costs for different protected groups, e.g. flowering plants versus fishes**

Highest Costs for Species 2005-2008

Chinook salmon *(Oncorhynchus tshawytscha)* and other anadromous fish –chinook, coho, and chum salmon and steelhead – account for $50M to $85M annually. Photo: Cornell U.

Cost Rank	2005		2006		2007		2008	
1	Chinook Salmon	$53,008,239	Chinook Salmon	$81,877,465	Chinook Salmon	$61,430,511	Chinook Salmon	$59,706,366
2	Steelhead	$40,005,202	Pallid Sturgeon	$45,099,621	Pallid Sturgeon	$54,963,608	Steelhead	$53,106,688
3	Pallid Sturgeon	$17,658,678	Steelhead	$31,836,666	Steelhead	$35,206,223	Pallid Sturgeon	$51,818,600
4	Sockeye Salmon	$12,122,112	Whooping Crane	$10,427,905	Least Tern	$10,925,303	Sockeye Salmon	$12,419,215
5	Piping Plover	$4,506,216	Least Tern	$5,400,831	Piping Plover	$10,420,604	Least Tern	$3,925,863
6	Least Tern	$4,003,827	Piping Plover	$5,265,091	Sockeye Salmon	$9,633,655	Valley Elederberry Longhorn Beetle	$3,492,593
7	Southwestern Willow Flycatcher	$3,346,170	Sockeye Salmon	$5,209,675	Bull Trout	$4,035,202	Piping Plover	$3,204,228
8	Loggerhead Sea Turtle	$2,609,613	White Sturgeon	$3,402,645	Valley Elederberry Longhorn Beetle	$2,676,927	Coho Salmon	$2,750,604
9	White Sturgeon	$1,406,438	Cape Sable Seaside Sparrow	$2,017,000	Southwestern Willow Flycatcher	$2,064,255	Least Bell's Vireo	$1,973,299
10	Bald Eagle[1]	$891,783	Loggerhead Sea Turtle	$1,594,693	Bald Eagle[1]	$1,585,621	Bull Trout	$1,925,177
11	Rio Grande Silvery Minnow	$843,475	Bald Eagle[1]	$1,459,453	Loggerhead Sea Turtle	$1,307,802	Whooping Crane	$1,513,700
12	Chum Salmon	$824,556	Bull Trout	$1,327,090	Cape Sable Seaside Sparrow	$971,422	Loggerhead Sea Turtle	$1,428,311
13	Kemp's Ridley Sea Turtle	$815,744	Coho Salmon	$1,137,958	Kemp's Ridley Sea Turtle	$617,048	Bald Eagle[1]	$1,173,193
14	West Indian Manatee	$743,377	West Indian Manatee	$683,336	Everglades Snail Kite	$592,020	Atlantic Salmon	$1,077,368
15	Bull Trout	$730,573	Southwestern Willow Flycatcher	$657,003	Higgins Eye (Pearlymussel)	$557,000	Roanoke Logperch	$910,815
16	Florida Panther	$441,200	Valley Elederberry Longhorn Beetle	$652,692	West Indian Manatee	$485,209	Green Sturgeon	$822,251
17	Higgins Eye (Pearlymussel)	$431,171	Higgins Eye (Pearlymussel)	$645,213	White Sturgeon	$465,715	Delta Smelt	$735,800
18	Gulf Sturgeon	$423,469	Kemp's Ridley Sea Turtle	$585,091	Green Sea Turtle	$381,756	Wood Stork	$733,412
19	Shortnose Sturgeon	$408,341	Green Sea Turtle	$493,765	Roanoke Logperch	$348,013	West Indian Manatee	$676,906

[1] The Bald Eagle costs are for monitoring of a delisted species. The Bald Eagle was delisted - that is the Bald Eagle is no longer threatened, the species has recovered. Monitoring of delisted species is required for varying lengths of time.

Invasive Species Expenditures and Costs Template

Zebra Mussels (*Dreissena polymorpha*) Photo: US Geological Survey

Since the 1960s the Corps has managed the Aquatic Plant Control Research Program, addressing management of such species as *Hydrilla (Hydrilla verticillata* (L. f.) Royle), and Eurasian Watermilfoil (*Myriophyllum spicatum* L.). In later years, the invasive Zebra Mussels (*Dreissena polymorpha*) began interfering with navigation, recreation, water supply, and other waterway uses. In the west, the invasive Salt Cedar (Tamarix spp.) was displacing native riparian vegetation and depleting groundwater.

It has become important to clearly identify the costs of prevention, control, and management of invasive species. Accurate costs must be incorporated into future budget projections and to predict performance and suitability of Corps infrastructure, public recreation areas, and public utilities.

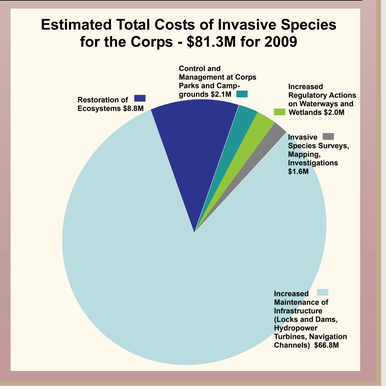
Salt Cedar (Tamarisk spp) (Photo: Steven Perkins, USDA-NRCS PLANTS)

Hydrilla (*Hydrilla Verticillata*) Photo: ERDC

Emerald Ash Borer (*Agrilus planipennis*), Photo: St. Paul District

Water Hyacinth (*Eichhornia crassipes*) Photo: ERDC

Expenditure	Costs
Leadership and Coordination Partners/coordinate with local, State, and Federal agencies and NGOs to manage invasive species at the project, regional and national levels.	
Operations – Division or District	12,500
Total	**$ 12,500**
Prevention Actions to prevent the introduction and establishment of invasive species to reduce their impact on the environment, the economy, and health of the United States.	
Operations – Division or District	250,000
Total	**$ 250,000**
Early Detection and Rapid Response Developing and enhancing the capacity to identify, report, and effectively respond to newly discovered and localized invasive species.	
Operations – Division or District	125,000
Total	**$ 125,000**
Control and Management Continuing and reducing the spread of invasive populations through management plan development; actions to eradicate, reduce, quarantine, or limit movement/transport of invasive species; maintenance actions required in response to invasive species impacts on equipment and infrastructure; and coordination with other agencies or groups for control efforts.	
Operations – Division or District	980,000
Total	**$ 980,000**
Restoration Establishment of native, appropriate low-impact, non-native, or "transitional" species on sites to prevent recolonization of invasives.	
Total	

To identify the magnitude and nature of expenditures for invasive species, an automated Costs Template was implemented to account for Corps' current (2008) expenditure outlays for Planning and Operations. For 2008 the Corps' direct costs were $16M.

Of perhaps greater interest is the estimation of total costs – that is, the additional costs of lost productivity. Such actions as increased maintenance due to removal of invasives from hydropower turbines, cleaning of invasives from lock chambers, and protection of firewood in campgrounds represent additional costs of invasive species. Work is currently underway to clearly delineate and estimate these opportunity costs. An initial effort using the 2009 Corps Budget shows that total invasive species costs are estimated at $81.3M.