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Costs Associated with Endangered Species Act Compliance

by Jim E. Henderson

PURPOSE: This technical note summarizes the U.S. Army Corps of Engineers (USACE or the Corps) costs for complying with the Endangered Species Act (P.L. 93-205) (ESA) in carrying out navigation, flood risk reduction, and ecosystem restoration missions from Fiscal Years 2005 through 2010. The costs were reported by USACE District, Division, and project personnel using the Costs Template for Threatened and Endangered Species Reporting (costs template) (Henderson 2012), developed under the Dredging Operations Technical Support (DOTS) program. The costs template is used by all Corps elements, e.g., hydropower, navigation, and recreation, to report annual ESA-related costs. Costs are reported for activities such as coordinating and consulting with the US Fish and Wildlife Service (USFWS) and the National Marine Fisheries Service (NMFS). Costs are also described for measures implemented to protect or avoid threatened and endangered species (TES); measures such as equipment modification, infrastructure construction and operation, monitoring activities, and land acquisition.

BACKGROUND: The ESA as amended in 1988 (PL 100-478), included a provision which required reporting expenditures "reasonably attributable to a species" beginning in 1990. This species by species accounting requirement became an annual data call to Federal agencies and states receiving section 6 grants in late autumn, reporting the previous fiscal year's (FY) costs to USFWS, who are responsible for compiling and reporting the results to Congress. Congress uses the information contained in the reports to either bolster claims for the effectiveness of the ESA in preventing species extinction or to denounce the costs of the ESA.

Implementation of costs reporting, as one might suspect, varied between and within agencies. General guidance was provided by the USFWS each autumn and has been found to be open to interpretation (USFWS 2011). Decentralized agencies could be expected to produce reports with varying degrees of consistency, accuracy, and reliability**.** Within USACE, the implementation process was left to the discretion of the Division, District, and project personnel, which led to a sometimes inconsistent, even arbitrary, reporting of the TES expenditures.

During a 2004 review of a USACE Missouri River project with ESA-related fiscal commitments, questions arose about TES costs within the USACE, at large. The FY2003 (FY03) TES expenditure reports showed that $1.2 billion had been spent by Federal agencies, with the Corps reporting $32 million. Among USACE environmental personnel, there was concern that the annual reporting produced very conservative estimates and that substantial expenditures were either not reported or were underestimated.

In 2005, an effort was initiated to establish a web-based reporting method in order to satisfy the need for a consistent, accurate, credible, and tractable method for accounting TES costs. Literature

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on economic costs or values related to endangered species costs or values, focuses primarily on Contingent Valuation Method studies of species preservation (Lew, Layton, and Rowe 2010; Wallmo 2006). Most studies consider public valuation of species preservation, and not costs of agency efforts. Cost categories for inclusion in the costs template were identified through review of Corps ESA decision documents (USACE Sacramento 2012, NMFS 2006, U.S. Army Engineer, Mississippi Valley Division 2012, Kozlowski 1993, PFMC 2002) and through development of expenditure categories for two high-cost TES within the Corp, sea turtles and least terns (Henderson and Smith 2007). The turtle and tern cost categories were then generalized to apply to all Corps activities (Henderson and Smith 2007). The cost categories for the Costs Template are shown in Figure 1. When the costs template was established, there was particular interest in identifying contracted versus in-house costs, so that all the entries for species costs (Figure 1) and the examples of expenditure reports in this tech note, e.g., Figures 8 to 11, have two columns (right hand expenditures are contract costs and the left hand column are in-house expenditures). In addition to the species by species accounting required by Congress, accommodations for expenditures for the implementation of the ESA program in general, not attributed to a single species, were included in an "Other Expenditures" spreadsheet (Figure 2) and included in the Costs Template.

Implementation of the Costs Template. Division Points of Contact (POCs) for TES were usually identified as the environmental or navigation personnel responsible for TES issues in each Division. The Division POCs helped identify District POCs, who in turn coordinated the reporting of the TES costs for their District. The TES expenditure reporting is managed by the U.S. Army Engineer Research and Development Center (ERDC), Vicksburg, MS, with the web-based Costs Template residing on the ERDC Environmental Laboratory's server. The Costs Template was launched September 2005. Annually, the request for reporting is distributed in November, with a January or February deadline, depending on the USFWS's schedule. After the January or February deadline, ERDC reviews the input and discrepancies are resolved through coordination with the POCs or the personnel inputting the data. Final input is provided to Division POCs for their review and approval, and using the USFWS data file format, expenditures are reported to USACE, Headquarters for transmitting to USFWS. Agency expenditures are then compiled by USFWS and reported to Congress.

Summary of Six Years Data

At the conclusion of the FY10 report of Corps TES expenditures, there are six years of USACE data available. These data are summarized here as:

- Comparison of USACE TES spending to total Corps Civil Works expenditures
- Identification of most costly species
- Overall spending for ESA compliance by taxonomic category
- FY05 to FY10 Expenditure Patterns for:
    - Sturgeons
    - Least terns and Piping plovers
    - Sea turtles
    - Whales

TES Expenditures Reporting - Costs Template		
SPECIES :		
Effects Determination	**Corps In-House**	**Contract**
1-1 Coordination and Determination		
1-2 Site Visits and Inspections		
1-3 Litigation and Office of Counsel Review		
1-4 Funding Transfers for Coordination and Effects Determination to Other Agencies, e.g., USFWS, NMFS, States; NGO.		
1-5 Funding Transfers for Coopertive Studies or Research		
1-6 In-house Research		
ESA Protection and Conservation Measures	**Corps In-House**	**Contract**
2-1 Inventory, Survey and Monitoring		
2-2 ESA and Incidental Take Observers		
2-3 Protection - Species		
-Avoidance		
-Relocation		
2-4 Protection - Habitat		
-Construction, Creation, Restoration		
-Disturbance Prevention (signage, fencing)		
2-5 Design for ESA Protection and Conservation Measures		
2-6 Construction and O&M of ESA infrastructure, e.g., fish ladders.		
2-7 Land Acquisition		
2-8 Funding Transfers for ESA Protection and Conservation Measures to Other Agencies, e.g., USFWS, NMFS, States		
2-9 Environmental Stewardship Labor (OMBIL)		
Equipment Costs	**Corps In-House**	**Contract**
3-1 Equipment Costs - Charges and Purchases		
3-2 Equipment Modifications due to ESA requirements		
Other Costs for the Species	**Corps In-House**	**Contract**
4-1 Other Costs Description		
Additional Remarks:		

Figure 1. TES costs template; per species data fields.

TES Expenditures Reporting - Costs Template

Category: Other Expenditures	Corps In-House	Contract
O-1Description:_____		
_____		
_____		
O-2 Description:_____		
_____		
_____		
O-3 Description:_____		
_____		
_____		

Figure 2. TES Costs Template Other Expenditures data fields.

TES Spending Compared to total USACE Expenditures

TES spending spiked in FY09 (Figure 3), but then returned near FY06 levels in FY10. This decrease was due to reduced mission requirements (total Corps spending (Figure 4), completion of large scale construction projects, and completion of planning stage investigations according to project and District personnel in the affected Districts (Larson 2011). Corps spending for TES has held at 3.65 percent of total Civil Works expenditures. The 2009 spike in TES expenditures is largely attributable to unusually high expenditures for pallid sturgeon and four species of salmonids that year.

While TES expenditures (Figures 3 and 4) tend to be positively correlated with highs and lows in Corps total spending (Figure 4), the 2006-2009 fluctuations in Civil Works spending were not reflected in TES costs. That is, commitments to ESA protection measures may require continued funding even if operations are scaled back or projects are not fully operational.

Corps Spending Patterns Under ESA

Corps annual TES costs often vary throughout the life of a project, that is, the implementation stage or status of a particular project. During project planning, Section 7 of the ESA may require formal consultation with USFWS and/or NMFS during which coordination on potential effects to species and consideration of reasonable and prudent alternatives and measures occur. During the construction and operation stages of projects, costs related to the implementation of alternatives and measures can vary considerably from initial short-term (often high expense) construction costs to long-term (often relatively lower) expense maintenance costs.

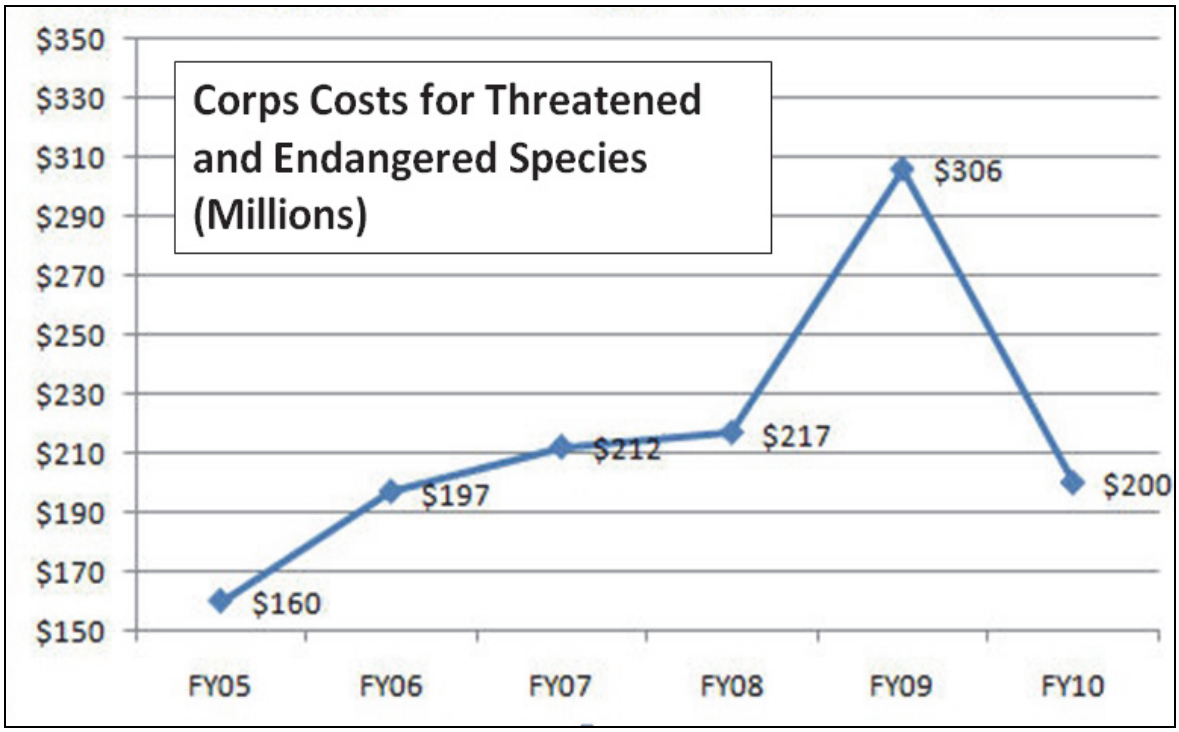

Figure 3. Annual TES spending by the Corps (costs template).

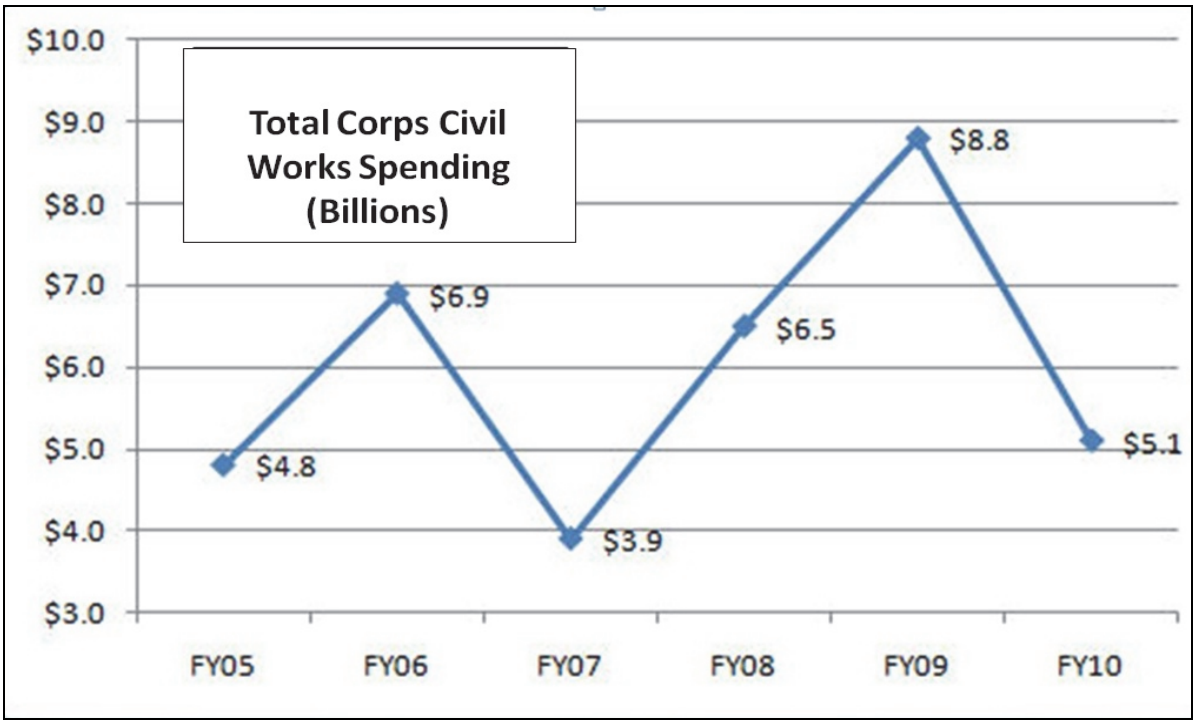

Figure 4. Total Corps Civil Works spending (Office of Management and Budget 2011).

Figure 5 shows the annual Corps costs for the Killer whale *(Orcinis orca)*, listed as endangered by NMFS in 2006 (USFWS 2012). FY06 costs are for coordination and litigation by the Seattle District, followed by higher construction costs in 2007. Once constructed, the Operations and Management (O&M) costs are lower. This pattern of high construction costs, followed by lower operations costs is a common pattern in the Corps' response to new species. As noted above, completion of construction stages of several projects followed by lower O&M costs were responsible for total Corps TES costs dropping between FY09 and FY10 (Figure 3).

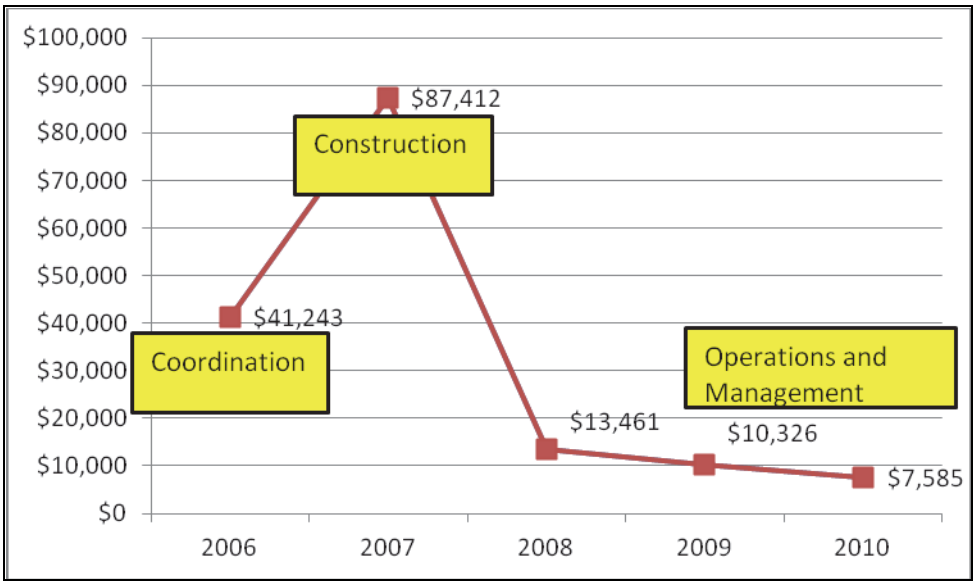

Figure 5. Annual costs reflecting ESA implementation steps.

The funding available for projects affects the annual expenditure spending patterns. Looking at the cycles and fluctuations of construction and operations, funding against actions and expenditures can provide understanding of the source of species' costs as well as sudden fluctuations (Wilson 2011) in total costs. Figure 6 shows FY05 – FY10 total funding for the Missouri River Restoration projects and the Kansas City and Omaha District costs for pallid sturgeon and least tern and piping plover for that same period. Peaks in restoration funding (2007), likely for construction, are matched with peaks in spending for pallid sturgeon and least tern and piping plover. The spending for pallid sturgeon exceeds the restoration project's spending, meaning there are other District projects that are also spending money on sturgeon.

Most Costly Species

Numerous species populations are managed on a river reach, seasonal, geographic, or watershed basis. Conservation measures for a particular river reach, season, or geographical area can respond to the biology of the subject species. USFWS or NMFS may delist species in particular river reaches or populations (NMFS and USFWS 2010). However, when expenditures are reported on the basis of the listed river reaches or seasons, and total costs for the species are not reported, the user must observe changes in spending for all listed populations or reaches so that overall expenditure trends for the species can be recognized. Table 1 shows the species for which USACE had the highest expenditures for FY05 – FY10. These costs come directly from the

expenditure reports generated using data entered into the costs template. For instance, Chinook salmon is consistently the most costly species, but the numbers in Table 1 are actually the summations of costs for the eleven listed populations of Chinook.

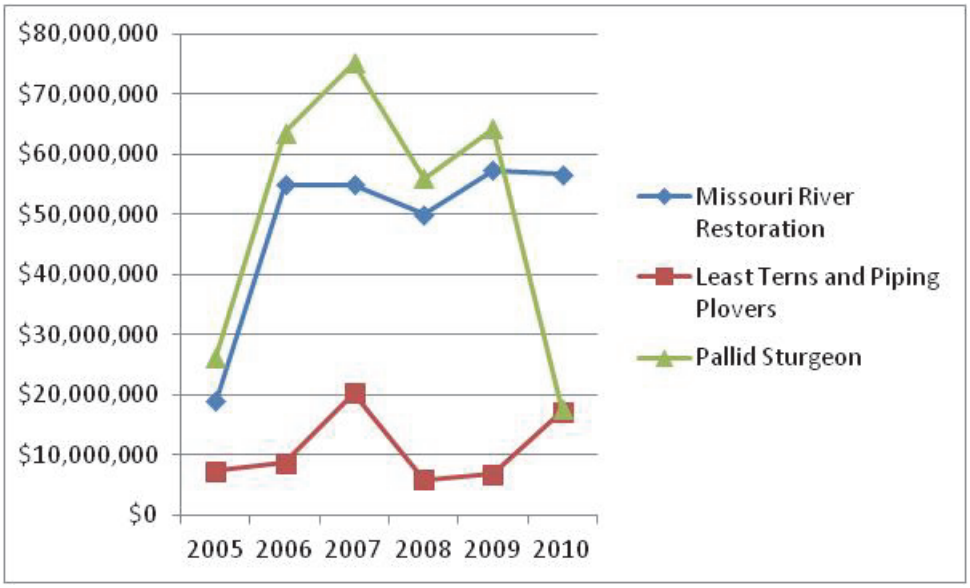

Figure 6. Comparison of Missouri River Restoration projects costs to Kansas City and Omaha District costs for least terns and piping plovers, and pallid sturgeon.

Examination of Table 1 shows that salmonids are consistently in the most costly group. Some species (e.g., Valley Elderberry Longhorn beetle), are in this group only for the years that the construction of conservation measures occurred.

TES Spending – Comparison of Annual Expenditures by Taxonomic Category and Species of Interest

For FY05-FY10, the USACE expenditures reported to USFWS for species (grouped by taxonomic categories) were as shown in Table 2.

Species Expenditure Patterns:

Sturgeon – All Species. Figure 12 shows total spending for sturgeon and Figure 13 shows how the sturgeon costs are apportioned between the sturgeon species for FY10.

Sturgeon. Expenditures for land purchases, construction, and other one-time expenditures can result in high annual expenditures followed by lower expenditures when construction is completed, as shown with the pallid sturgeon as shown in Figure 6. Figure 7 shows the distribution of FY05 to FY10 reported expenditures. Overall costs in 2010 are lower (Figures 7 and 8) in part because construction and land acquisition costs incurred during 2007 – 2009 were much less than in 2010 (Figures 9 to 11).

Table 1. Most coslty TES for the Corps

2005		2006		2007		2008		2009		2010	
Chinook Salmon	$53,008,239	Chinook Salmon	$81,877,465	Chinook Salmon	$61,430,511	Chinook Salmon	$59,706,366	Chinook Salmon	$108,571,170	Chinook salmon	$54,144,944
Steelhead	$40,005,202	Pallid Sturgeon	$45,099,621	Pallid Sturgeon	$54,963,608	Steelhead	$53,106,688	Steelhead	$74,997,429	Steelhead	$50,058,997
Pallid Sturgeon	$17,658,678	Steelhead	$31,836,666	Steelhead	$35,206,223	Pallid Sturgeon	$51,818,600	Pallid Sturgeon	$47,762,152	Pallid Sturgeon	$19,666,417
Sockeye Salmon	$12,122,112	Whooping Crane	$10,427,905	Least Tern	$10,925,303	Sockeye Salmon	$12,419,215	Sockeye Salmon	$14,812,997	Piping Plover	$11,264,151
Piping Plover	$4,506,216	Least Tern	$5,400,831	Piping Plover	$10,420,604	Least Tern	$3,925,863	Piping Plover	$4,032,251	Least Tern	$11,252,068
Least Tern	$4,003,827	Piping Plover	$5,265,091	Sockeye Salmon	$9,633,655	Valley Elederberry Longhorn Beetle	$3,492,593	Least Tern	$3,992,882	Sockeye Salmon	$8,339,974
Southwestern Willow Flycatcher	$3,346,170	Sockeye Salmon	$5,209,675	Bull Trout	$4,035,202	Piping Plover	$3,204,228	Least Bell's Vireo	$3,989,260	Santa Ana Sucker	$7,082,613
Loggerhead Sea Turtle	$2,609,613	White Sturgeon	$3,402,645	Valley Elederberry Longhorn Beetle	$2,676,927	Coho Salmon	$2,750,604	West Indian Manatee	$3,854,186	Least Bell's Vireo	$5,913,599
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	Chum Salmon	$3,209,254	California Least Tern	$5,644,312
Bald Eagle[1]	$891,783	Loggerhead Sea Turtle	$1,594,693	Bald Eagle[1]	$1,585,621	Bull Trout	$1,925,177	Rio Grande Silvery Minnow	$3,087,645	Bald Eagle[1]	$5,594,535
Rio Grande Silvery Minnow	$843,475	Bald Eagle[1]	$1,459,453	Loggerhead Sea Turtle	$1,307,802	Whooping Crane	$1,513,700	Coho Salmon	$2,693,942	Coho Salmon	$4,667,350
Chum Salmon	$824,556	Bull Trout	$1,327,090	Cape Sable Seaside Sparrow	$971,422	Loggerhead Sea Turtle	$1,428,311	Giant Garter Snake	$2,598,620	Bull Trout	$2,757,991
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	Bald Eagle[1]	$2,431,376	Chum Salmon	$2,724,775
West Indian Manatee	$743,377	West Indian Manatee	$683,336	Everglades Snail Kite	$592,020	Atlantic Salmon	$1,077,368	White Sturgeon	$2,001,100	Brown Pelican	$1,837,880
Bull Trout	$730,573	Southwestern Willow Flycatcher	$657,003	Higgins Eye (Pearlymussel)	$557,000	Roanoke Logperch	$910,815	Loggerhead Sea Turtle	$1,807,725	West Indian Manatee	$1,458,814
Florida Panther	$441,200	Valley Elederberry Longhorn Beetle	$652,692	West Indian Manatee	$485,209	Green Sturgeon	$822,251	Bull Trout	$1,754,210	Whooping Crane	$1,252,894
Higgins Eye (Pearlymussel)	$431,171	Higgins Eye (Pearlymussel)	$645,213	White Sturgeon	$465,715	Delta Smelt	$735,800	N. American Green Sturgeon	$1,736,686	Loggerhead Sea Turtle	$1,003,995
Gulf Sturgeon	$423,469	Kemp's Ridley Sea Turtle	$585,091	Green Sea Turtle	$381,756	Wood Stork	$733,412	Southwestern Willow Flycatcher	$1,587,845	Rio Grande Silvery Minnow	$848,527
Shortnose Sturgeon	$408,341	Green Sea Turtle	$493,765	Roanoke Logperch	$348,013	West Indian Manatee	$676,906	Valley Elederberry Longhorn Beetle	$980,604	Green Sturgeon	$749,377

[1] The Bald Eagle costs are for monitoring of a delisted species.
delisted - no longer threatened, species recovered.

Table 2. FY05 through FY10 major taxa and Other Expenditures						
	FY05	**FY06**	**FY07**	**FY08**	**FY09**	**FY10**
Fish	$129,754,831	$164,086,028	$169,872,992	$202,913,153	$267,007,351	$153,888,690
Reptiles	$4,879,706	$3,928,092	$3,192,152	$3,687,830	$7,363,247	$3,541,890
Birds	$15,198,912	$21,533,578	$27,954,871	$14,775,368	$20,039,257	$45,777,802
Mammals	$1,981,685	$1,933,382	$2,037,962	$1,712,290	$5,887,835	$3,774,832
Clams	$906,656	$1,271,192	$1,389,419	$1,591,893	$1,814,218	$2,188,753
Flowering Plants	$1,447,005	$846,136	$648,050	$542,309	$1,088,794	$1,173,206
Amphibians	$61,370	$167,242	$49,546	$207,626	$307,171	$343,432
Snails	$29,431	$40,328	$45,158	$13,124	$33,423	$154,976
Conifers		$2,200	$1,500	$150	$1,200	$4,080
Corals			$17,859	$16,661	$124,486	$378,845
Insects	$405,211	$682,448	$2,724,101	$2,797,585	$1,078,196	$442,409
Ferns	$1,800	$2,100	$3,100	$1,000	$1,500	$20,356
Lichens		$3,750		$4,510		
Crustaceans	$4,110	$36,060	$56,023	$198,800	$210,985	$71,132
Arachnids	$1,600	$1,600	$1,600	$3,800	$4,400	$12,400
Other Expenditures	$154,672,317 $5,359,109	$194,534,136 $2,672,523	$207,994,333 $4,033,166	$228,466,099 $2,030,558	$304,962,063 $1,818,382	$211,772,803 $1,480,763
TOTALS	$160,031,426	$197,206,659	$212,027,499	$230,496,657	$306,780,445	$213,253,566

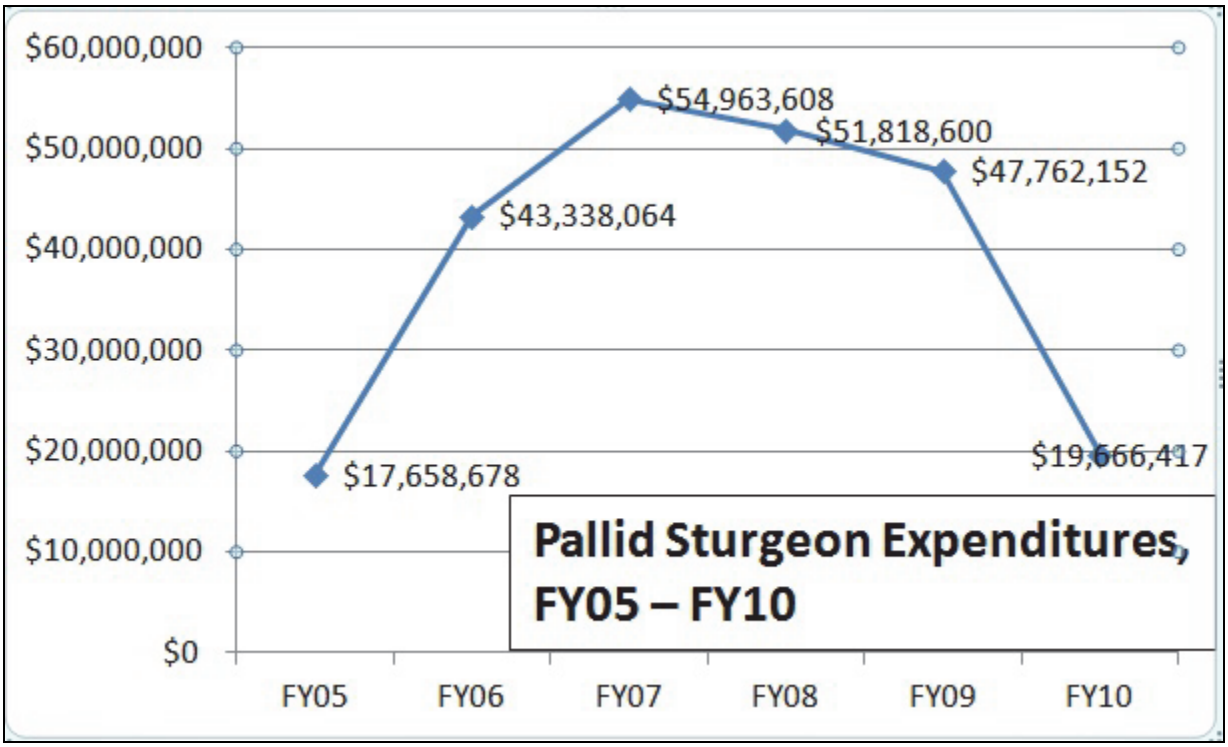

Figure 7. Pallid sturgeon expenditures, FY05 through FY10 (costs template).

2-4 Protection - Habitat: Construction, Creation, Restoration		
MVM - Function/Element: Planning and Program Management	$ 70,000	$ 0
MVN - Function/Element: Operations - Environmental Stewardship - Bonnet Carre Spillway	$ 4,000	$ 0
MVS - Function/Element: Operations - Navigation	$ 976,776	$ 0
NWK - Function/Element: Planning and Program Management	$ 156,411	$ 431,469
NWO - Function/Element: Other - Civil Works -River Recovery	$ 0	$ 493,657
Total	**$ 1,207,187**	**$ 925,126**
2-5 Design for ESA Protection and Conservation Measures		
MVS - Function/Element: Operations - Navigation	$ 96,136	$ 0
NWK - Function/Element: Planning and Program Management	$ 841,339	$ 332,116
NWO - Function/Element: Other - Civil Works -River Recovery	$ 908,381	$ 147,250
Total	**$ 1,845,856**	**$ 479,366**
2-6 Construction and O&M of ESA infrastructure, e.g., fish ladders		
NWO - Function/Element: Other - Civil Works -River Recovery	$ 0	$ 1,788,000
Total	**$ 0**	**$ 1,788,000**
2-7 Land Acquisition		
NWK - Function/Element: Planning and Program Management	$ 610,425	$ 477,249
NWO - Function/Element: Other - Civil Works -River Recovery	$ 514,800	$ 0
Total	**$ 1,125,225**	**$ 477,249**
2-8 Funding Transfers for ESA Protection and Conservation Measures to Other Agencies, e.g., USFWS, NMFS, States		

Figure 8. FY10 Pallid Sturgeon Costs (costs template). Construction - $2,132,313 (Corps $1,207,187, Contract $925,126); Land Acquisition Total: $1,602,474 (Corps $1,125,225, Contract $477,249).

ESA Protection and Conservation Measures		
2-1 Inventory, Survey and Monitoring		
MVM - Function/Element: Planning and Program Management	$ 6,000	$ 0
MVN - Function/Element: Operations - Environmental Stewardship - Old River Control	$ 10,000	$ 0
MVS - Function/Element: Operations - Environmental Stewardship	$ 264,508	$ 64,694
NWO - Function/Element: Planning and Program Management	$ 3,003,000	$ 807,000
Total	**$ 3,283,508**	**$ 871,694**
2-4 Protection - Habitat: Construction, Creation, Restoration		
MVM - Function/Element: Planning and Program Management	$ 40,000	$ 0
MVS - Function/Element: Operations - Environmental Stewardship	$ 8,998	$ 495,440
NWK - Function/Element: Planning and Program Management	$ 1,000,000	$ 6,000,000
NWO - Function/Element: Planning and Program Management	$ 7,348,000	$ 0
Total	**$ 8,396,998**	**$ 6,495,440**
2-5 Design for ESA Protection and Conservation Measures		
MVS - Function/Element: Operations - Environmental Stewardship	$ 243,651	$ 5,000
NWK - Function/Element: Planning and Program Management	$ 2,000,000	$ 6,000,000
Total	**$ 2,243,651**	**$ 6,005,000**
2-7 Land Acquisition		
NWK - Function/Element: Planning and Program Management	$ 7,000,000	$ 150,000
NWO - Function/Element: Planning and Program Management	$ 263,000	$ 3,775,000
Total	**$ 7,263,000**	**$ 3,925,000**
2-8 Funding Transfers for ESA Protection and Conservation Measures to Other Agencies, e.g., USFWS, NMFS, States		

Figure 9. FY07 Pallid Sturgeon Costs (costs template). Construction Total $14,892,438 (Corps $8,396,998, Contract $6,495,440). Land Acquisition Total: $11,188,000 (Corps $7,263,000, Contract $3,925,000)

2-7 Land Acquisition		
NWK - Function/Element: Planning and Program Management	$ 16,446,000	$ 133,000
NWO - Function/Element: Planning and Program Management	$ 143,000	$ 418,000
Total	**$ 16,589,000**	**$ 551,000**

Figure 10. FY08 Pallid Sturgeon Costs (costs template). Land Acquisition Total $17,140,000 (Corps $16,589,000, Contract $551,000).

2-4 Protection - Habitat: Construction, Creation, Restoration		
MVM - Function/Element: Planning and Program Management	$ 20,000	$ 0
MVS - Function/Element: Operations - Navigation	$ 1,468,421	$ 0
NWK - Function/Element: Planning and Program Management	$ 413,674	$ 1,686,317
NWO - Function/Element: Other - Civil Works	$ 0	$ 150,000
NWO - Function/Element: Other - Civil Works-River Recovery	$ 387,674	$ 11,089,067
NWO - Function/Element: Planning and Program Management	$ 459,080	$ 1,839,842
Total	**$ 2,748,849**	**$ 14,765,226**
2-5 Design for ESA Protection and Conservation Measures		
MVS - Function/Element: Operations - Navigation	$ 109,701	$ 0
NWK - Function/Element: Planning and Program Management	$ 1,072,403	$ 617,146
NWO - Function/Element: Other - Civil Works	$ 15,000	$ 0
NWO - Function/Element: Other - Civil Works-River Recovery	$ 391,947	$ 96,841
Total	**$ 1,589,051**	**$ 713,987**
2-6 Construction and O&M of ESA infrastructure, e.g., fish ladders		
NWO - Function/Element: Other - Civil Works-River Recovery	$ 0	$ 2,454,977
Total	**$ 0**	**$ 2,454,977**
2-7 Land Acquisition		
NWK - Function/Element: Planning and Program Management	$ 753,483	$ 5,280,288
NWO - Function/Element: Other - Civil Works-River Recovery	$ 308,085	$ 3,697,869
Total	**$ 1,061,568**	**$ 8,978,157**
2-8 Funding Transfers for ESA Protection and Conservation Measures to Other Agencies, e.g., USFWS, NMFS, States		
MVN - Function/Element: Operations - Environmental Stewardship - Bonnet Carre Spillway	$ 0	$ 25,000

Figure 11. FY09 Pallid Sturgeon Costs (costs template). Construction $17,514,075 (Corps $2,748,849, Contract $14,765,226). Land Acquisition - $10,039,725 (Corps $1,061,568, Contract $8,978,157).

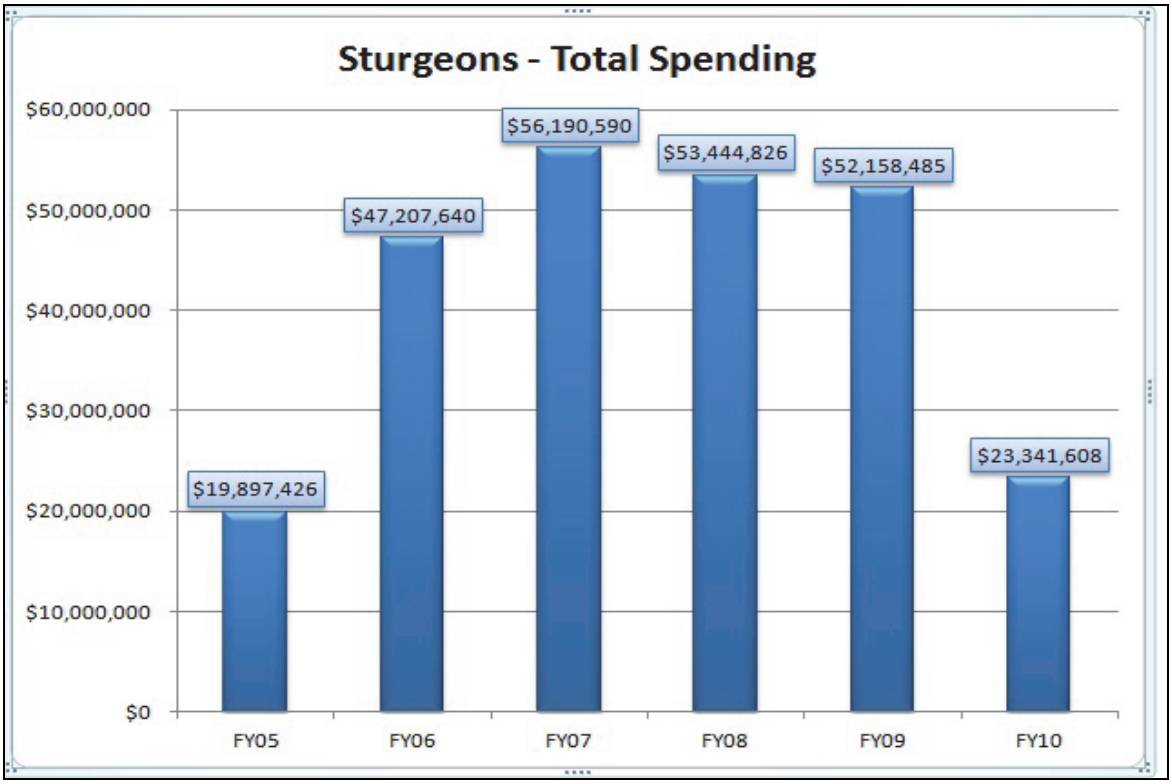

Figure 12. Sturgeon costs FY05 through FY10 (costs template).

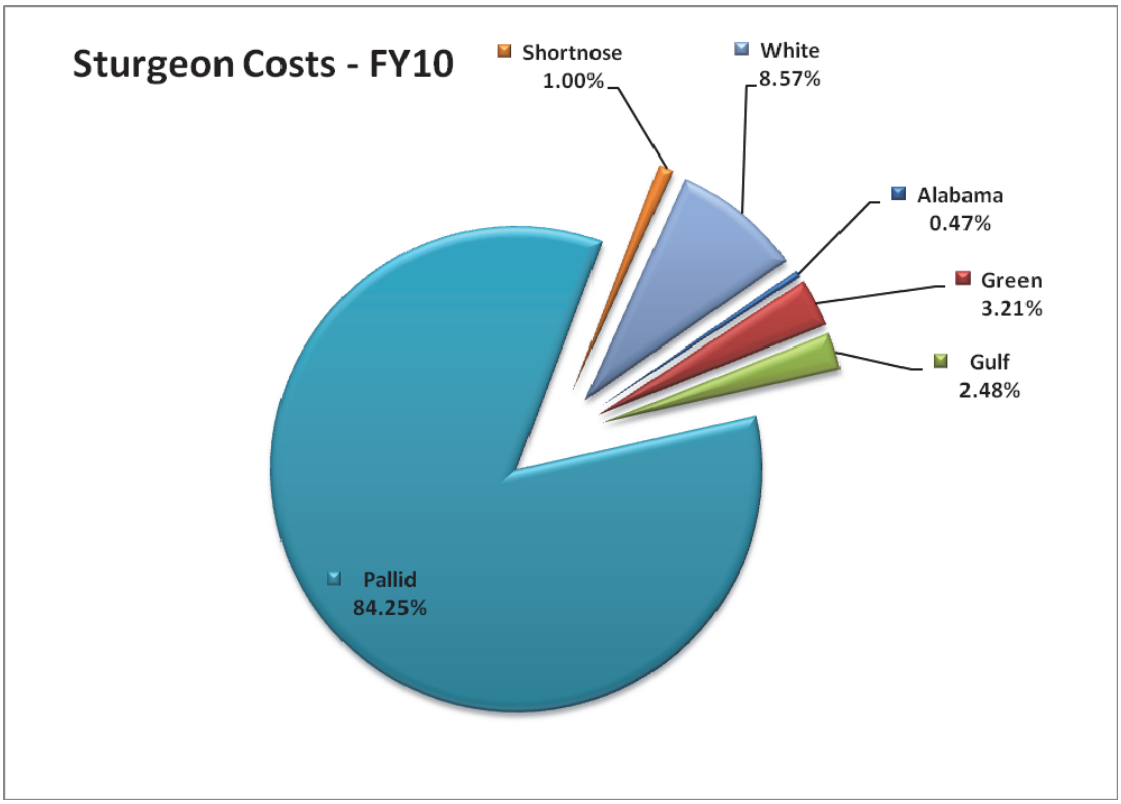

Figure 13. FY10 sturgeon costs by species (costs template).

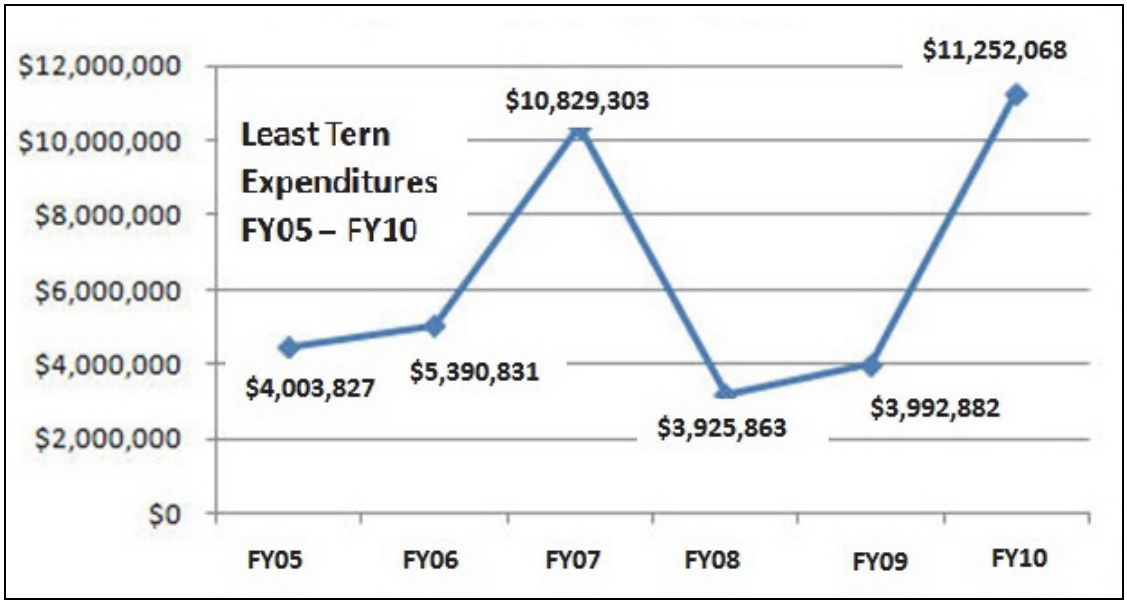

Figure 14. Least tern expenditures, FY05 through FY10 (costs template).

2-4 Protection - Habitat: Construction, Creation, Restoration		
MVM - Function/Element: Planning and Program Management	$ 80,000	$ 0
MVS - Function/Element: Operations - Environmental Stewardship	$ 1,000	$ 10,000
NWO - Function/Element: Planning and Program Management	$ 6,237,000	$ 0
SPA - Function/Element: Operations - Environmental Stewardship - John Martin	$ 20,000	$ 0
SWL - Function/Element: Planning and Program Management	$ 178	$ 1,066
SWT - Function/Element: Operations - Environmental Stewardship	$ 1,000	$ 6,000
Total	**$ 6,339,178**	**$ 17,066**

Figure 15. FY07 Least Tern costs (costs template).

2-4 Protection - Habitat: Construction, Creation, Restoration		
MVM - Function/Element: Planning and Program Management	$ 30,000	$ 0
MVS - Function/Element: Operations - Environmental Stewardship	$ 40,000	$ 0
NWK - Function/Element: Planning and Program Management	$ 0	$ 25,000
NWO - Function/Element: Other - Civil Works-River Recovery	$ 0	$ 1,111,250
SWT - Function/Element: Operations - Environmental Stewardship	$ 5,000	$ 2,000,000
Total	**$ 75,000**	**$ 3,136,250**
2-4 Protection - Habitat: Disturbance Prevention (signage, fencing)		
MVS - Function/Element: Operations - Environmental Stewardship	$ 500	$ 0
NWK - Function/Element: Planning and Program Management	$ 0	$ 24,476
NWO - Function/Element: Other - Civil Works-River Recovery	$ 0	$ 20,985
SWT - Function/Element: Operations - Environmental Stewardship	$ 1,000	$ 0
Total	**$ 1,500**	**$ 45,461**
2-7 Land Acquisition		
NWO - Function/Element: Other - Civil Works-River Recovery	$ 3,533,333	$ 0
Total	**$ 3,533,333**	**$ 0**

Figure 16. FY10 Least Tern expenditures (costs template).

Least Terns and Piping Plovers. In Figure 14, higher Least Tern costs for FY07 and FY10 correspond with a spike in construction and land acquisition activities for navigation projects on the Missouri River (Figures 15 and 16).

The ESA requires that costs be reported by species. In many cases, multiple species are managed with the same protective actions, which requires multiple species-serving costs to be apportioned among individual species[1] (USFS 2011). Thus, costs for the piping plovers (Figures 17 to 19), using the same habitat as the Least Terns, are nearly identical to the Least Terns, because the same actions benefit both species (Figures 14 to 16).

Sea Turtles. The TES affected by navigation have focused resources on sea turtles, marine mammals, and shore birds. ESA-related expenditures for nearly all reported species of sea turtle TES were less than average in FY07. A substantial rise in expenditures for sea turtles is shown in Figures 20 through 24 for FY09. Spending for sea turtles (Figures 20 to 24) and whales (Figures 25 to 27) are presented here.

1 The guidance (USFWS 2011) says "Expenditures in a single project devoted to a number of listed species should be prorated by species, if possible."

Whales. The Corps' marine operations, primarily dredging, incur TES costs with whales as well as the sea turtles reported above. Of the eight species of listed whales, the Right whale is the most costly, due to its range (eight districts reporting) and the costs associated with avoidance actions (Figure 25).

Costs for other whale species are primarily for coordination (Figure 26) of the Humpback, Finback, Sperm, Sei, Blue, and Bowhead whales.

The listing as endangered of the Killer whale population for California, Oregon, and Washington, resulted in the costs shown in Figure 27. The coordination and litigation costs associated with a candidate species and potential new listing (FY06) is followed by design and construction costs for protection measures (FY07), and then lower operations costs in FY08 through FY2010.

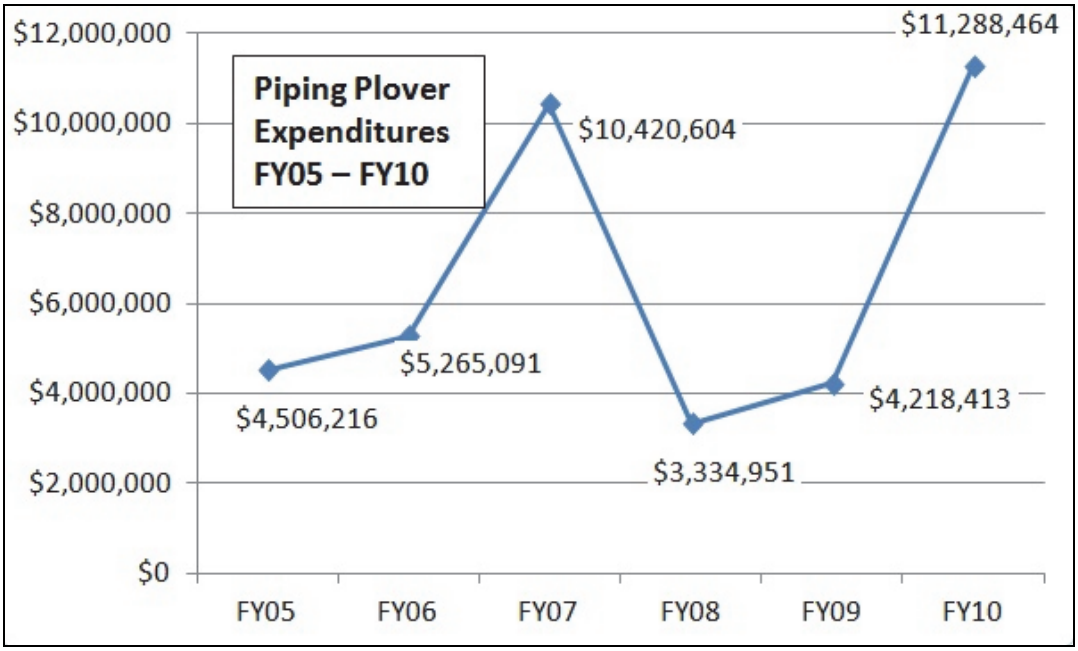

Figure 17. Piping plover costs FY05 through FY10 (costs template).

2-4 Protection - Habitat: Construction, Creation, Restoration		
NAE - Function/Element: Operations - Environmental Stewardship	$ 2,000	$ 0
NWO - Function/Element: Planning and Program Management	$ 6,237,000	$ 0
SPA - Function/Element: Operations - Environmental Stewardship - John Martin	$ 20,000	$ 0
Total	**$ 6,259,000**	**$ 0**
2-4 Protection - Habitat: Disturbance Prevention (signage, fencing)		
NAE - Function/Element: Operations - Environmental Stewardship	$ 1,000	$ 0

Figure 18. FY07 Piping plover costs Construction $6,259.000.

2-4 Protection - Habitat: Construction, Creation, Restoration		
NWK - Function/Element: Planning and Program Management	$ 0	$ 25,000
NWO - Function/Element: Other - Civil Works-River Recovery	$ 0	$ 1,111,250
SAJ - Function/Element: Operations - Navigation	$ 0	$ 126,930
SWG - Function/Element: Operations - Navigation	$ 0	$ 1,750,000
Total	**$ 0**	**$ 3,013,180**
2-4 Protection - Habitat: Disturbance Prevention (signage, fencing)		
NWK - Function/Element: Planning and Program Management	$ 0	$ 24,476
NWO - Function/Element: Other - Civil Works-River Recovery	$ 0	$ 20,985
Total	**$ 0**	**$ 45,461**
2-5 Design for ESA Protection and Conservation Measures		
NAE - Function/Element: Operations - Navigation	$ 2,000	$ 0
NAE - Function/Element: Planning and Program Management	$ 1,000	$ 0
NAN - Function/Element: Planning and Program Management	$ 5,000	$ 0
Total	**$ 8,000**	**$ 0**
2-7 Land Acquisition		
NWO - Function/Element: Other - Civil Works-River Recovery	$ 3,533,333	$ 0
Total	**$ 3,533,333**	**$ 0**

Figure 19. FY10 Piping plover costs Construction $3,013,180 Land Acquisition $3,533,333.

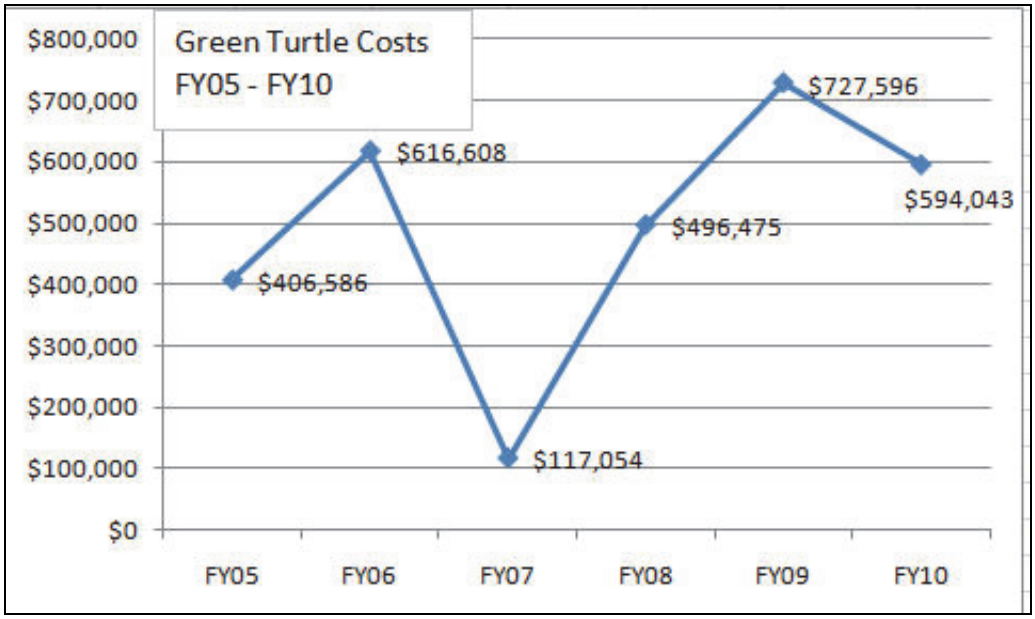

Figure 20. Green turtle costs FY05 through FY10 (costs template).

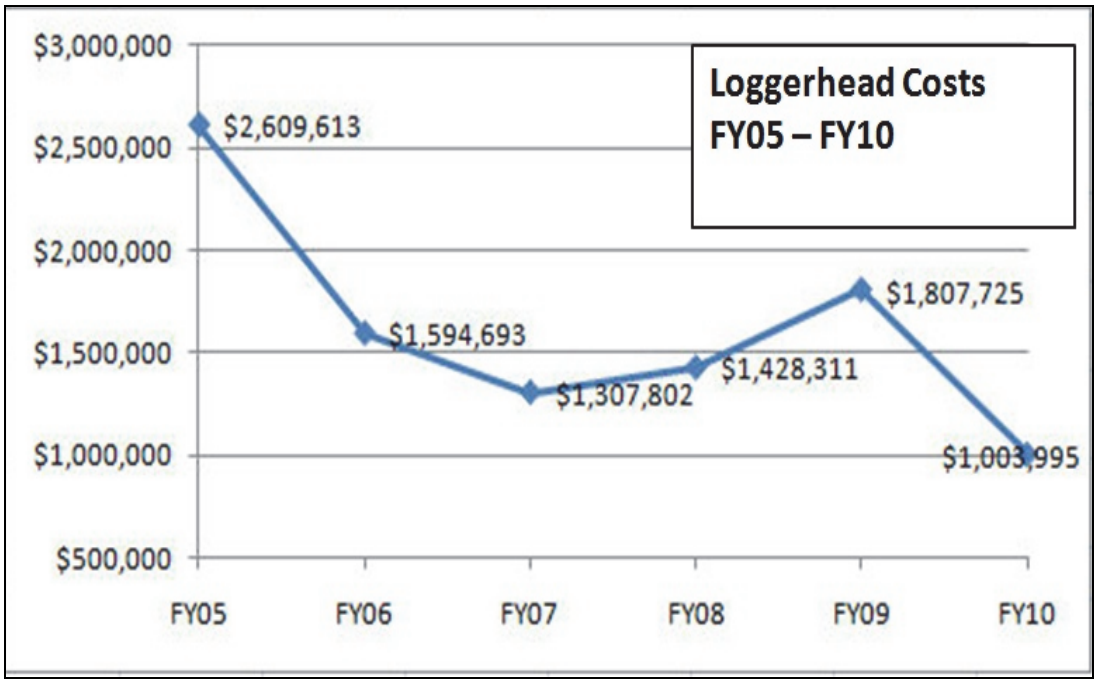

Figure 21. Loggerhead turtle costs FY05 through FY10 (costs template).

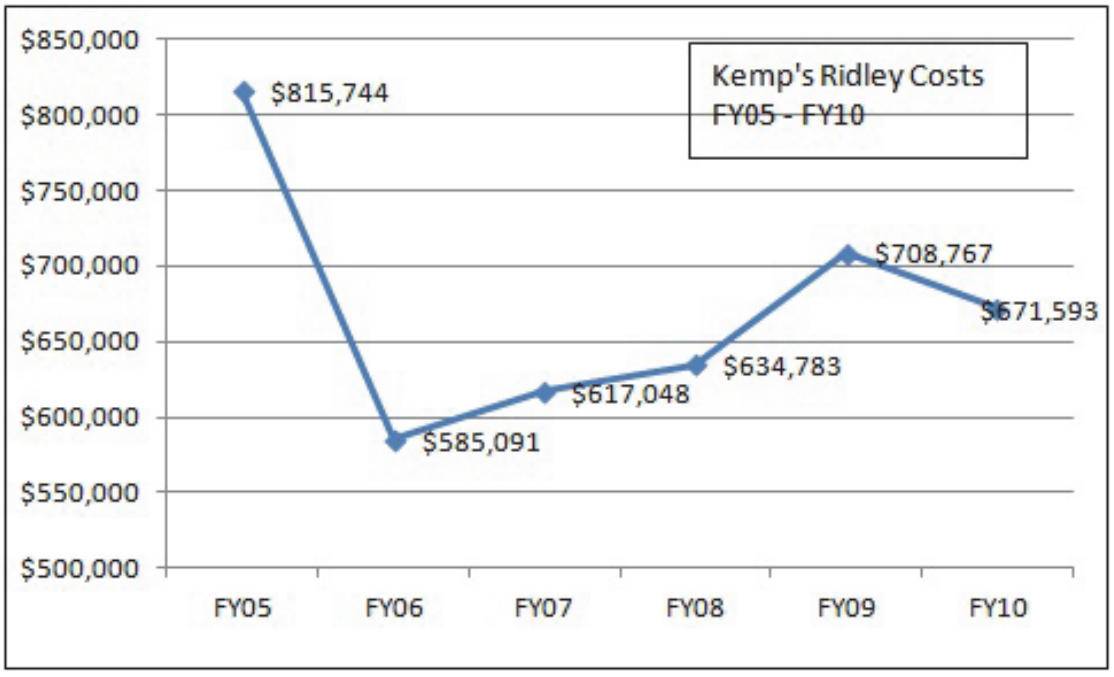

Figure 22. Kemp's Ridley turtle costs FY05 through FY10 (costs template).

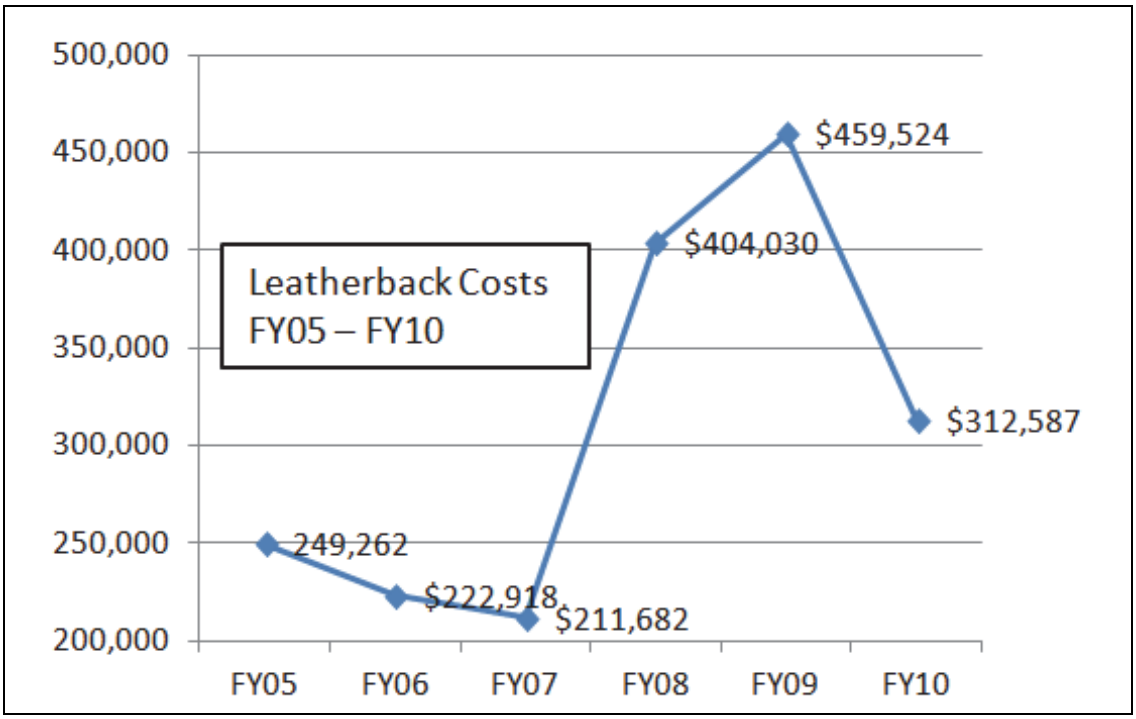

Figure 23. Leatherback turtle costs FY05 through FY10 (costs template).

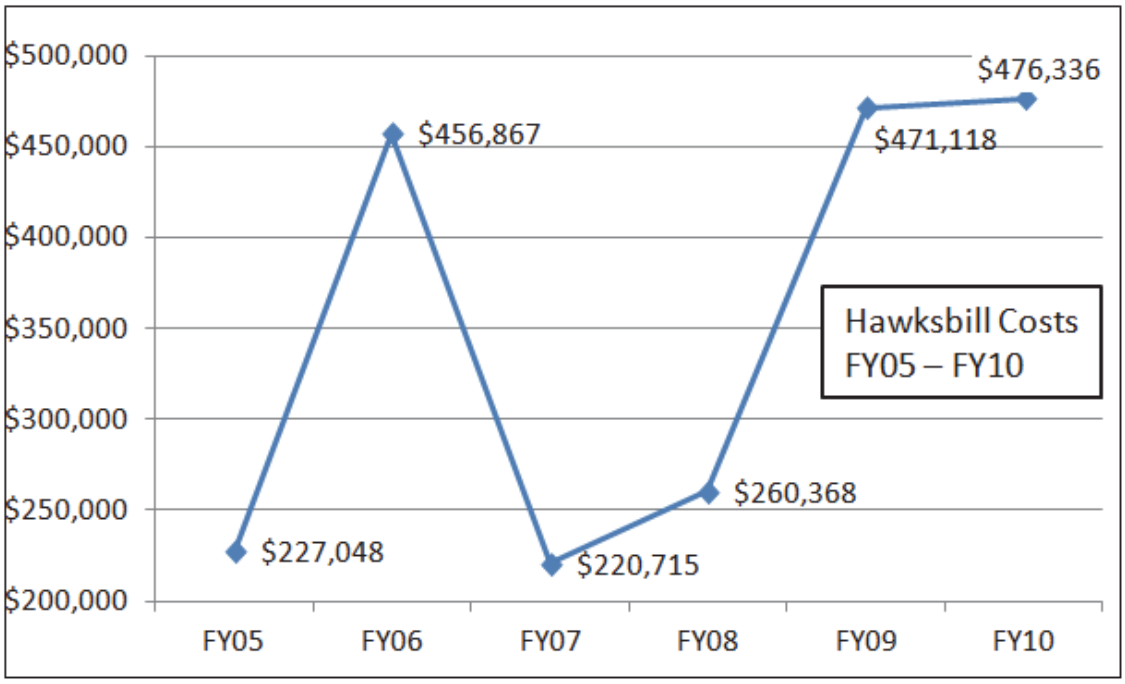

Figure 24. Hawksbill turtle costs FY05 through FY10 (costs template).

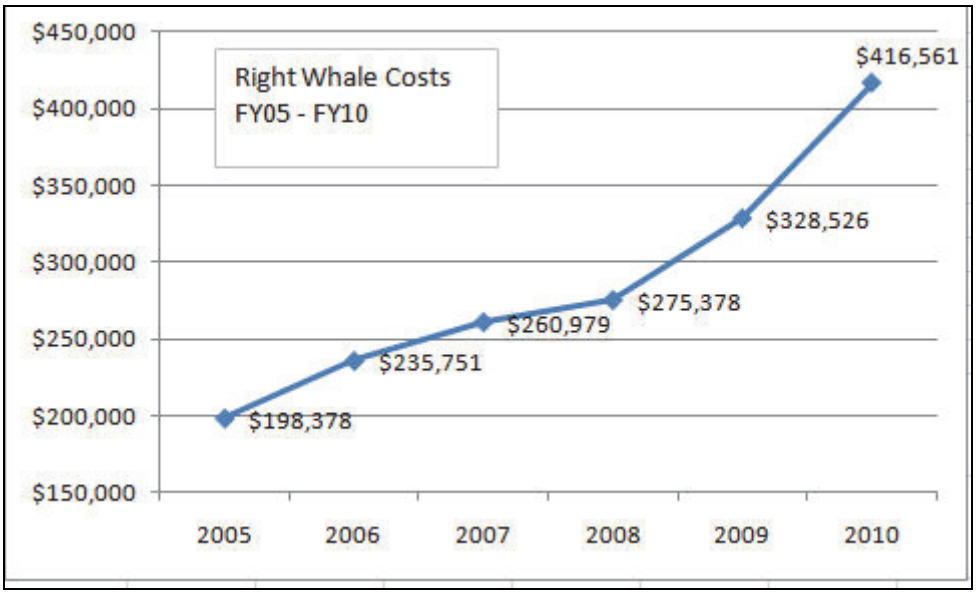

Figure 25. Right whale costs FY05 through FY10 (costs template).

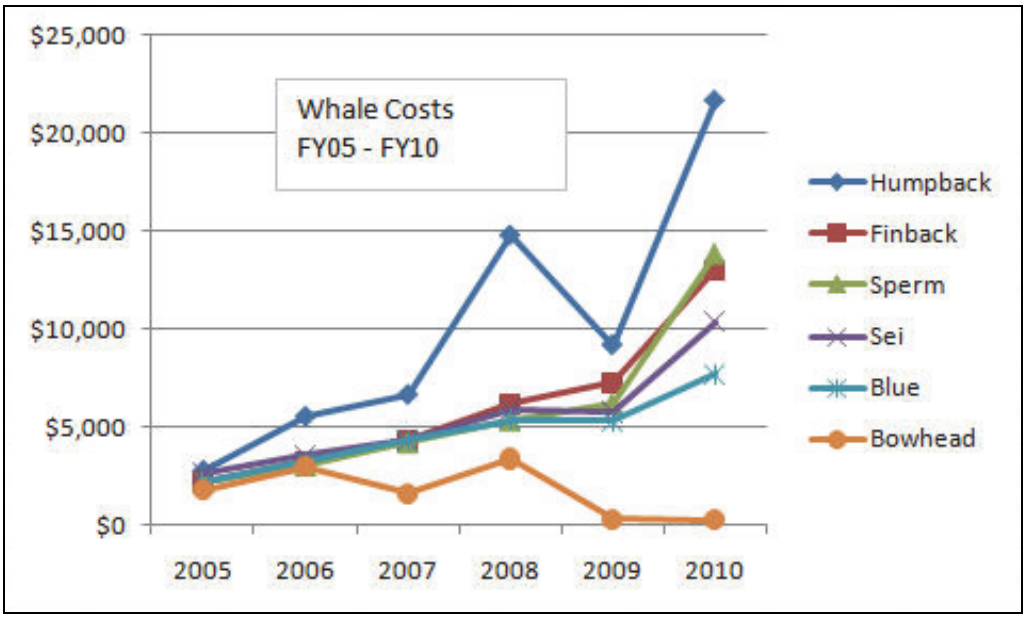

Figure 26. Other whales costs FY05 through FY10 (costs template).

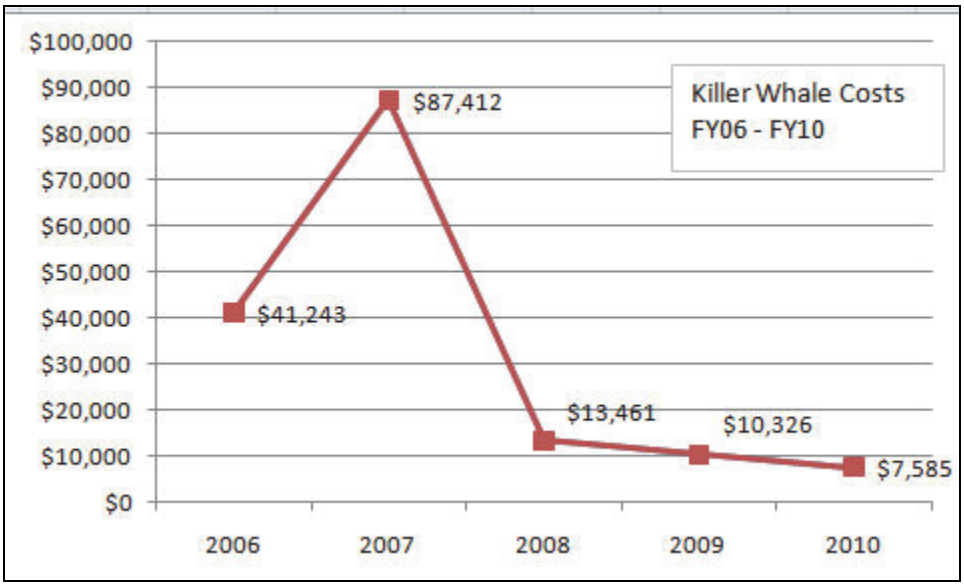

Figure 27. Killer whale costs, FY06 through FY10 (costs template).

SUMMARY

If total funding becomes constrained or uncertain, expenditures related to ESA compliance could reduce the capability of the Corps to fulfill its missions and projects. The Costs Template for Threatened and Endangered Species Reporting provides a tractable, credible, and accessible vehicle for reporting, summarizing, and documenting TES costs. Using the costs template, TES expenditure reporting, has significantly improved, thus ensuring completeness of the Corps effort for reporting compliance. Like other databases, the information that can be extracted from the costs template is just that, information, which could be used to inform decision making. It is recommended that a summary as contained herein be prepared every three years to provide timely information for input to budgetary and other agency decisions. In addition, the costs template information could be used for a source of costs to be considered along with other costs during planning and operations alternatives analyses.

The six years of TES expenditure data may be viewed as illustrative of trends and future commitments of funding, but should be utilized cautiously. Several factors are attributed to that caution. Corps projects systematically address problems and opportunities so that TES actions are incorporated along with other project components. The list of species changes when new species must be accommodated with new construction. Patterns of spending, coordination, construction, and operations for a species (Figures 5 and 6) can be used to consider TES costs over the life of a project; however, parsing out the TES costs, species by species, might be done arbitrarily. The reporting requirements by Congress, species by species, and USFWS's organization of the reporting, by major taxa (Table 2), can serve to mask the challenges to systems management; these requirements impose some of the arbitrariness in the costs reported. For example, if an observer on a dredge costs a fixed price, the species by species costs is higher if there are fewer TES species to be observing. Conversely, costs are lower, on a species by species basis, if there are more numerous species being affected by a single reported activity. The costs presented in this tech note and in the costs template expenditure reports should be viewed with these constraints in mind.

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> Henderson, J.E. 2013. *Costs associated with Endangered Species Act Compliance.* Dredging Operations Technical Support Technical Notes Collection ERDC/TN EEDP-06-23. Vicksburg, MS: U.S. Army Engineer Research and Development Center. An electronic copy of this TN is available from http://el.erdc.usase.army/dots.

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