

The Costs and Value of Federal Scientific Collections

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Project

- America COMPETES Reauthorization Act tasked OSTP with developing “a common set of methodologies...for the assessment and projection of costs associated with the management and preservation of [Federal] scientific collections”
- OSTP asked STPI to provide analytical support to the IWGSC to address the mandate

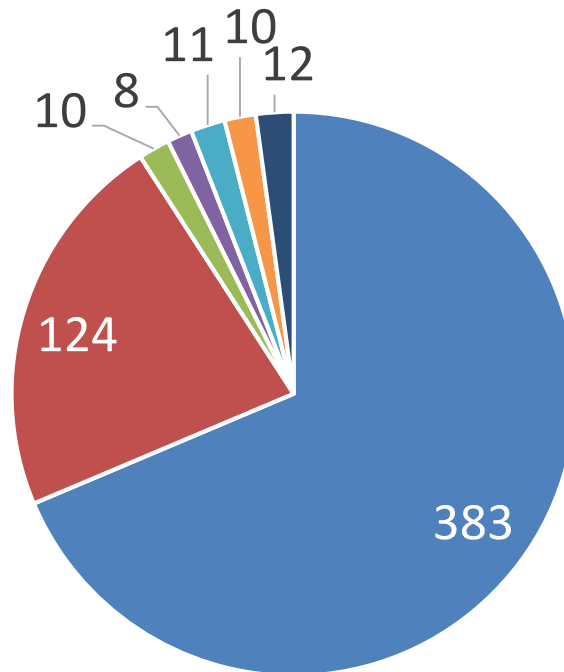
Methodology

- Characterize scientific collections
 - U.S. Federal Scientific Collections (USFSC) Registry
 - Agency annual reports
 - Site visits
- Estimate costs
 - Federal budget
 - Annual reports
 - Bottom up estimates from major components of costs
- Estimate value
 - Previous studies of value
 - Cost savings
 - Replacement costs
- Compare value to costs



DOI and USDA have largest number of collections

Number of Federal Collections Reported in Registry

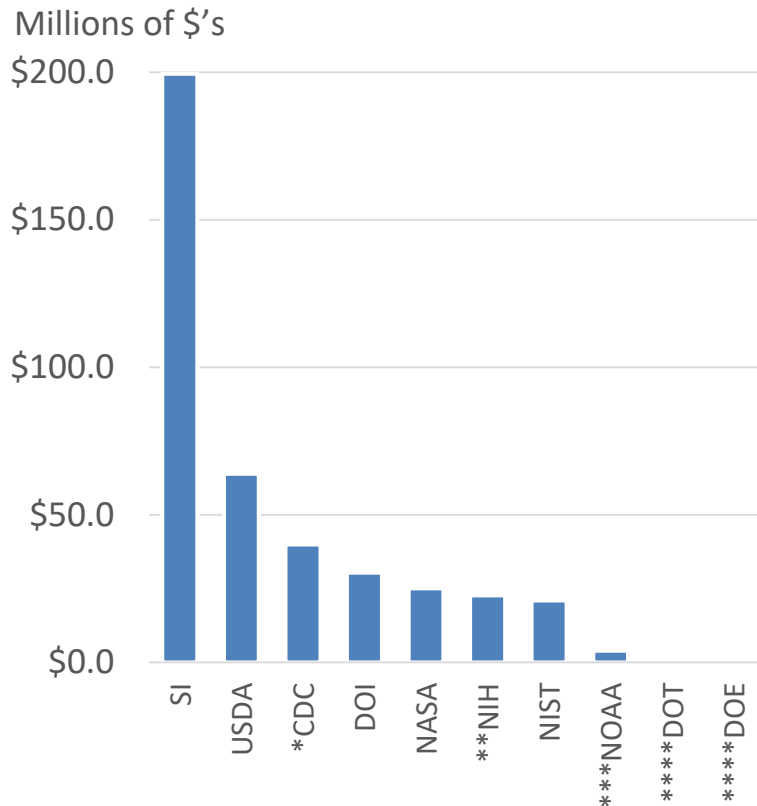


■ DOI ■ USDA ■ Smithsonian ■ EPA ■ HHS ■ NASA ■ Other*

*Other includes Department of Commerce, Department of Energy, Department of Transportation, Veterans Affairs, U.S. Botanic Gardens, Navajo Nation, and university-held

Costs of Federal collections

Costs in FY2016



- Facility costs one of the largest
- Personnel costs constitute large share of operating costs, but number of staff often small
- Funding
 - Federal appropriations
 - Fees and user charges
 - Grants and contracts

*CDC costs represent fixed amount for the CDC biorepository plus the average annual value of ATCC contracts from 2010 to 2016.

**NIH costs represent one institutional collection, 12 cohort collections, and the average annual value of ATCC contracts from 2010 to 2016.

*** NOAA cost data is from 2013.

****DOT and DOE collection costs are too small to be visible on graph.

Value of many collections hard to estimate quantitatively

- Value varies by type and purpose of collection
- Best documented benefits are increased agricultural output traced to collections of seeds and other genetic material
- Value to public health calculated in terms of diminished mortality, sick days
- Several disciplines (entomology, botany) depend on collections; value can be measured in research cost savings
- Collections also serve to educate and edify the public, but value hard to measure in dollars

Benefit-Cost ratios for agriculture germplasm collections run from 2 to 71

Study	Citation	Benefit-Cost Ratio
Soybean resistance to soybean cyst nematode	Zohrabian et al. 2003	36:1 to 61:1
Spring bread wheat resistance to Russian wheat aphid	Gollin et al. 2000	2:1 to 11:1
Economic impact of the International Rice Research Institute	Evenson and Gollin 1997	4:1 to 19:1
New variety of cassava for Thailand and Vietnam	Robinson and Srinivasan 2013	37:1
Developing C88 potato varietal for China	Robinson and Srinivasan 2013	15:1
Breeding more productive strains of wheat	Heisey et al. 1999	11:1 to 60:1
Improving coffee plants	Hein and Gatzweiler 2006	29:1 to 71:1*
Standard reference material for sulfur in fossil fuels	Martin et al. 2000	113:1

Notes: *Calculated by STPI from information from Hein and Gatzweiler (2006).

Other estimates of value

- Collections play small, but important role in developing new vaccines
 - Average benefit to cost ratio of vaccine for *Haemophilus influenzae type b* was 3.3
 - Benefits of 10 vaccines for developing countries over \$350 billion; benefit-cost ratio very high
- Scientific collections can also be valued in terms of replacement costs
 - Museum of Texas Tech University estimates mammal collection would cost \$73.21 per specimen to replace
 - Using this estimate, replacement value of 590,000 mammal specimens at the Smithsonian would be \$43.2 million

Key Takeaways

- Registry lists 558 unique wide-ranging Federal scientific collections
- Agency costs of collections range from <\$100,000 for Department of Energy to \$200 million for Smithsonian Institution
- Annualized benefits to cost ratios of collections large, in some cases 60 times costs