

# CHAPTER 2: Benefits of Map Modernization and Successes to Date

Section 3(c)(5) of the 2006 CBRRA requires that this final pilot project report contain an analysis of any benefits that the public would receive by using digital mapping technology for all CBRs units. This chapter contains a summary of the challenges associated with the CBRs maps; the two separate but complementary efforts underway to modernize the CBRs maps (digital conversion and comprehensive map modernization); the benefits and successes associated with the two different mapping processes; and the Service's efforts to provide CBRs maps and digital boundary data more efficiently to its customers and partners.

The maps depicting the CBRs were last comprehensively revised in 1990 using now antiquated manual cartographic technologies and base maps that were already outdated at the time, some dating as far back as the 1940s. The 1990s era maps are: (1) imprecise and inaccurate (the CBRs boundary lines are 80-100 feet wide on the surface of the Earth, and the underlying features they are meant to follow are not always correctly depicted on the base maps); (2) difficult to use (the scanned paper maps are incompatible with the Geographic Information Systems (GIS) commonly used today); and (3) in some cases contain errors affecting property owners and project proponents. See Figures 6 and 7 for examples of some of the challenges associated with the maps.

The benefits and successes of both the digital conversion and comprehensive map modernization efforts are described in this chapter, and Figure 8 illustrates the differences between the two processes. The digital conversion effort solves many of the main challenges associated with the maps by more precisely depicting the CBRs boundaries on updated



Figure 6. CBRs boundaries on the 1990s era maps can be difficult to interpret because they are typically about 80-100 feet wide on-the-ground. This 1990 map for Rhode Island Unit D01 shows a boundary segment that is about 165 feet wide in one area.

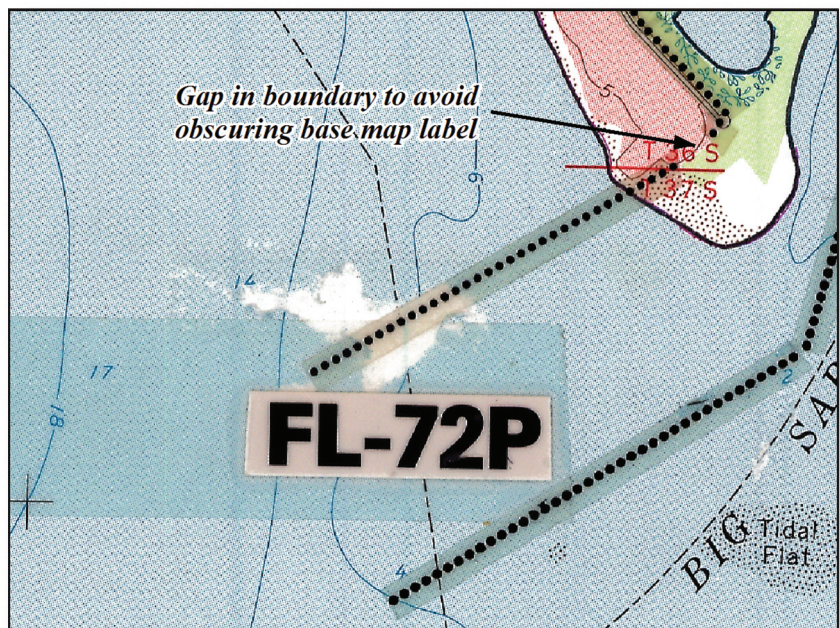


Figure 7. On the 1990s era maps, OPA boundaries were created with strips of tape depicting a dot pattern. The cartographers opted to avoid obscuring annotation on the base maps by leaving gaps in the boundary, such as the one shown on the 1994 map for Florida Unit FL-72P.

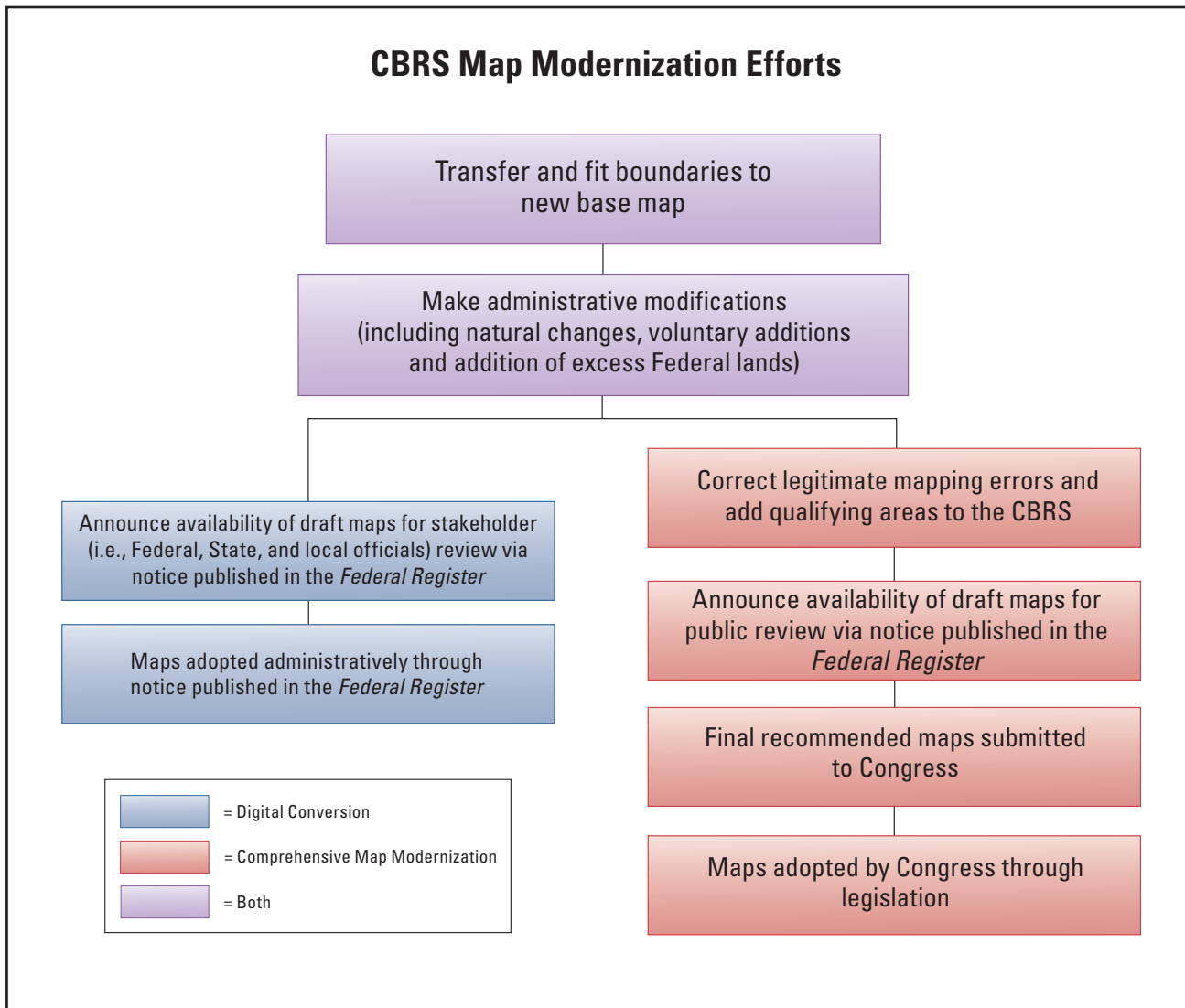


Figure 8. This diagram illustrates the differences between the digital conversion process and the comprehensive map modernization process.

base maps and making the maps available in a GIS format with revised boundaries to account for natural changes; however, the digital conversion does not address mapping errors. Mapping errors negatively affect property owners and result in frequent challenges to the CBRS maps. Comprehensive map modernization not only transfers the CBRS boundaries to new base maps and makes modifications necessary to account for natural changes, but also corrects errors that affect property owners and adds areas appropriate for inclusion to the CBRS. However, comprehensive map modernization takes a significant amount of time and resources.

In addition to making progress on modernizing the CBRS maps through digital conversion and comprehensive map modernization, over the last decade, the Service has also modernized the delivery of CBRS information to the public by making a CBRS boundary dataset available for use in GIS applications and making the CBRS boundaries available through a CBRS Mapper on our website.

#### Digital Conversion

Recognizing that comprehensive map modernization for the entire CBRS is a time and resource intensive endeavor, the Service and

FEMA entered into an interagency partnership in 2011 to facilitate a more timely digital conversion of the official maps. By the end of 2016, the Service will have completed digital conversion maps for 19 of the 23 States and Territories that contain CBRS units, covering more than 90 percent of the total CBRS acreage.<sup>1</sup> All of the pilot project units underwent the digital conversion process between 2014 and 2016.

Through the digital conversion effort, the existing CBRS boundaries are: (1) transferred and fitted to updated base maps (i.e., a recent aerial image) to ensure that the boundaries correspond with the

natural or development features they are clearly intended to follow on the official maps (such adjustments are generally within the width of the existing CBRS boundary); (2) modified to reflect any natural changes that have occurred since the maps were last updated (this is known as the five-year review) and to incorporate any voluntary additions and additions of excess Federal property within the CBRS; and (3) in limited circumstances, modified to correct any administrative errors made in the past in either (a) the transcription of the boundaries from maps that were reviewed and approved by Congress to the official CBRS maps on file with the Service or (b) the previous inclusion of unqualifying (e.g., developed) areas to the CBRS through a map modification to account for natural changes under 16 U.S.C. 3503(c).<sup>2</sup> The revised maps prepared through the digital conversion process undergo stakeholder review by Federal, State, and local officials, and are made effective administratively by the Service through a notice of final map availability published in the *Federal Register*.

Changes to the CBRS boundaries through digital conversion are limited to the administrative modifications the Secretary is authorized to make under the CBRA.<sup>3</sup> Changes that are outside the scope of these authorities cannot be made through the digital conversion process; such changes must be made through the comprehensive map modernization process, which is described in the “Comprehensive Map Modernization” section below.

**Benefits and Successes Associated with Digital Conversion**

The digital conversion effort provides the public with more accurate, reliable, and user-friendly CBRS maps and digital boundary data that can be integrated into GIS. The benefits of digital conversion include: (1) more accurate and user-friendly CBRS information; (2) improved accuracy of CBRS boundaries on FEMA’s Flood

Insurance Rate Maps (FIRM); (3) increased awareness of and compliance with the CBRA; and (4) opportunities for State, local, and non-governmental conservation efforts.

• **More Accurate and User-Friendly CBRS Information**

The digital conversion effort significantly improves the accuracy and reliability of the CBRS maps and boundary data. It has historically been very difficult for the public and Federal agencies responsible for implementing the CBRA to interpret the 1990s era CBRS maps. The Service receives numerous requests from Federal and State agencies, local communities, property owners, and other entities to determine whether or not a particular property or project site is located within the CBRS. Using the old and difficult to interpret paper maps requires a time and labor intensive review, causing delays in the issuance of Federal flood insurance (and therefore delays to real estate transactions), delays in Federally-funded infrastructure

projects, and delays in the provision of disaster assistance.

Digitally converted maps make determining whether particular properties and project sites are located within the CBRS much simpler, faster, cheaper, and less prone to error. In many cases the public is able to determine themselves within minutes whether a property or project site is located within the CBRS by using the Service’s online CBRS Mapper instead of waiting for such a determination from the Service.

• **Improved Accuracy of CBRS Boundaries on FEMA’s Flood Insurance Rate Maps**

The digital conversion effort ensures that the CBRS boundaries provided to FEMA during development of FIRMs are consistent with those depicted on the official CBRS maps and within the CBRS Mapper maintained by the Service. Although the Service maintains the official CBRS maps, the FEMA FIRMs are still the most utilized source for landowners, insurance agents,

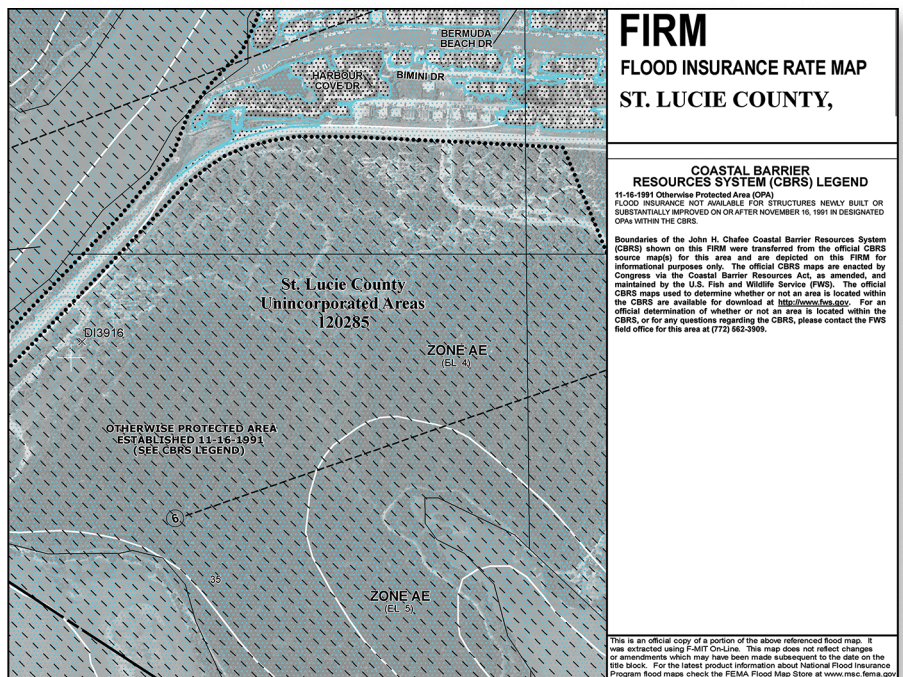


Figure 9. FEMA Flood Insurance Rate Map showing CBRS boundaries (hatched area).

and other interested parties to access CBRS information. In the past there have been cases where the FIRMs have not matched the official CBRS maps, which led to the issuance of erroneous Federal flood insurance policies within the CBRS and hardships for many homeowners. In 2006, the Service and FEMA entered into an interagency partnership whereby the Service places the CBRS boundaries on FIRMs to ensure an accurate depiction of the CBRS boundaries on the FIRMs. This interagency effort has resulted in the placement of the more accurate CBRS boundaries on FIRMs. The CBRS information depicted on the FIRMs is not updated real-time. Instead, users can now access the most recent and reliable CBRS maps and digital boundary data via the Service's website and CBRS Mapper instead of relying solely on the FEMA FIRMs for CBRS information.

- **Increased Awareness of and Compliance with the CBRA**  
The digital conversion effort improves the accuracy, integrity, and usability of the CBRS data and maps, which in turn increases awareness of and compliance with the CBRA by reducing erroneous Federal expenditures (including invalid flood insurance policies) within the CBRS. The 1990s CBRS maps have historically made full compliance with the CBRA challenging for Federal agencies because they are difficult to interpret and incompatible with the GIS systems that are widely used today. The maps have also created challenges for the insurance industry. In CBRS areas, Federal flood insurance is generally not available for structures constructed after the area was included within the CBRS.<sup>4</sup> The Service is frequently contacted by insurance agents who have written invalid Federal flood insurance policies within the CBRS because they

were unaware of the CBRA designation affecting the property. In these cases, FEMA may not pay a flood insurance claim for the invalid policy, even if it is first discovered to be invalid after the claim is made.

In 2007, the GAO issued a report entitled *Coastal Barrier Resources System: Status of Development That Has Occurred and Financial Assistance Provided by Federal Agencies*.<sup>5</sup> This report found that four Federal agencies provided \$21 million of prohibited financial assistance within the CBRS. FEMA cited the lack of updated CBRS maps and limitations with mapping technology as the primary reasons for the errors. The report recommended that the Secretary direct the Service to place a high priority on completing efforts to develop digital maps that more accurately depict unit boundaries. Modernized maps will help reduce the number of erroneous Federal flood insurance policies that are issued, and will also help ensure that flood insurance and disaster assistance claims are not paid in violation of the CBRA following a storm.

The CBRA requires that Federal agencies annually certify to the Secretary that their actions are consistent with the CBRA's prohibitions on Federal expenditures.<sup>6</sup> Digitally converted CBRS maps will enhance outreach efforts at Federal, State, and local levels and help facilitate Federal certification of CBRA compliance.

- **Opportunities for State, Local, and Non-Governmental Conservation Efforts**  
The Service believes that the CBRA works best when coupled with State, local, and non-governmental actions to protect coastal barriers. The digital conversion effort helps conserve natural resources by enabling State and local governments to

integrate CBRS boundaries into their GIS for planning and conservation efforts. For example, the State of Maine has enacted a law prohibiting the expenditure of State funds within the Federally-designated CBRS.<sup>7</sup> Additionally, digital conversion helps facilitate the voluntary addition of land to the CBRS. Conservation groups and other non-governmental entities have requested that their land be included within System Units of the CBRS in order to add another layer of protection to their land.<sup>8</sup> The Service reviews such requests and can incorporate qualifying voluntary additions within the CBRS as the maps are updated through the digital conversion effort.

### **Comprehensive Map Modernization**

Congress recognized the need for modernized CBRS maps and, in the 2000 CBRRA, directed the Secretary to complete a pilot project for up to 75 CBRS areas. In the 2006 CBRRA, Congress directs the Secretary to finalize the pilot project, prepare digital maps for the entire CBRS, and recommend additions to the CBRS through the map modernization effort.

The comprehensive map modernization approach requires a thorough review process and generally follows these steps: (1) research by the Service into the intent of the original boundaries and the development status on-the-ground at the time the areas were originally included within the CBRS (the Service generally does not recommend removal of areas from the CBRS unless there is compelling evidence that a mapping error was made); (2) preparation of draft revised maps by the Service; (3) public review of the draft maps; (4) preparation of final recommended maps by the Service that take into consideration information provided during the public comment period; and (5) Congressional enactment of legislation to make the revised maps effective.

The Service receives requests from numerous property owners and other interested parties who seek to remove areas from the CBRS. When the Service finds a technical mapping error that warrants a change in one part of a CBRS map, we also review adjacent areas on the map to ensure that the entire map is accurate. This comprehensive approach to map revisions (which was developed many years ago in coordination with the House Natural Resources Subcommittee that oversees the CBRA) treats all affected landowners equitably. It is also more efficient and cost-effective in the long-run because it ensures that all legitimate errors are corrected and any new areas appropriate for inclusion within the CBRS are identified at the same time.<sup>9</sup>

Through fiscal year 2016, the Service has prepared comprehensively modernized maps for approximately 15 percent of the total CBRS acreage (including the pilot project maps). The Service has a project underway to prepare comprehensively revised draft maps for all CBRS units in eight northeastern States affected by Hurricane Sandy<sup>10</sup> (comprising an additional 15 percent of the total acreage of the CBRS), and will create comprehensively modernized maps for the remainder of the CBRS as resources are made available for this effort.

### ***Benefits and Successes Associated with Comprehensive Map Modernization***

In addition to all of the benefits of the digital conversion effort listed above, comprehensive map modernization also: (1) addresses mapping errors by removing areas that were previously included in error and (2) conserves natural resources by adding qualifying new areas to the CBRS.

- **Address Mapping Errors**

Some of the CBRS maps contain errors that negatively affect property owners. The Service receives numerous requests

from property owners and other interested parties who seek to remove land from the CBRS. The Service addresses these requests by objectively applying standard review criteria (see Chapter 6 for an explanation of the Service's guiding principles and criteria for addressing mapping errors). The Service generally does not recommend removal of land from the CBRS unless there is compelling evidence that a mapping error was made.

Through comprehensive map modernization the Service conducts a thorough assessment of each CBRS unit and corrects legitimate mapping errors, thereby making the maps less prone to future challenges and preserving the long-term integrity of the CBRS.

- **Add Qualifying Areas**

The addition of new qualifying lands to the CBRS through comprehensive map modernization reduces future taxpayer subsidies for flood insurance, coastal infrastructure, and disaster assistance within vulnerable areas along the coast. Expansion of the CBRS also helps enhance the capacity of coastal barriers and wetlands to protect mainland communities from coastal storms, conserves important habitat for many fish and wildlife species, and increases public safety by reducing the intensity of development within these areas.<sup>11</sup>

CBRS maps can help communities plan for long-term coastal resiliency by steering development away from vulnerable and valuable natural resources and areas that are susceptible to the effects of climate change such as sea level rise and storm surge, as well as other extreme weather events. The CBRA's removal of Federal funds acts as a

disincentive to develop these areas and can help reduce the amount of damage that would otherwise have been caused by storms like Hurricanes Katrina, Ike, Irene, and Sandy. Private entities can develop within the CBRS, but the CBRA shifts the cost for rebuilding homes and infrastructure away from the Federal taxpayer to private and other non-Federal parties who choose to take the financial risk associated with developing these vulnerable areas.

### **Digital Data and CBRS Mapper**

In addition to modernizing the maps, the Service continues to enhance the accessibility and usability of CBRS boundary data for our customers and the public. In 2008, the Service created an "approximate" (accurate to within about 150 feet) digital CBRS boundary dataset for use in GIS applications, which was made available for download on the Service's CBRS website. Since 2014, the Service has begun replacing that approximate digital boundary data with more precise data as it is produced for individual CBRS units through digital conversion and comprehensive map modernization projects.

In the wake of Hurricane Sandy in 2012, the Service created a CBRS Mapper that allows the public to view the digital CBRS boundaries without the need for GIS software. Additionally, the Service now makes digital CBRS boundary data available at Federal data repositories such as the Federal Government's open data warehouse "www.data.gov"<sup>12</sup> and NOAA's Digital Coast,<sup>13</sup> and plans to provide a web mapping service published through ArcGIS Online.<sup>14</sup>

The digital CBRS boundaries and the CBRS Mapper fulfill an important need for easily accessible and GIS compatible CBRS data, which helps improve government efficiency and customer service while also increasing awareness of and compliance with the CBRA.

- <sup>1</sup> The Service will not prepare digital conversion maps for Massachusetts, Rhode Island, Connecticut, or most of the Atlantic coast of New York at this time because the maps for those particular States will be revised through a separate project to comprehensively modernize all of the CBRS maps for eight northeastern States affected by Hurricane Sandy (see endnote 10 below).
- <sup>2</sup> Additional information about the digital conversion effort, including the Service's methodology, can be found in the notice published by the Service in the *Federal Register* on August 29, 2013 (78 FR 53467).
- <sup>3</sup> See endnotes 23, 24, and 25 in Chapter 1.
- <sup>4</sup> The NFIP has a Flood Insurance Manual (FIM) that is used primarily by insurers and agents selling and servicing Federal flood insurance. Section 19 of the FIM contains information regarding flood insurance eligibility for structures located within the CBRS. The FIM is accessible on FEMA's website at: <https://www.fema.gov/flood-insurance-manual>. The regulations implementing the CBRA with regards to Federal flood insurance eligibility within the CBRS can be found in 44 Code of Federal Regulations Part 71.
- <sup>5</sup> See endnote 19 in Chapter 1.
- <sup>6</sup> 16 U.S.C. 3506(b)
- <sup>7</sup> Maine Revised Statutes (38 Rev. Stat. sec. 1901-1905).
- <sup>8</sup> See endnote 22 in Chapter 1.
- <sup>9</sup> The 2006 CBRA authorizes the Secretary to prepare digital maps for the remaining CBRS units outside of the pilot project (Section 4 of Pub. L. 109-226).
- <sup>10</sup> The CBRS units that are being remapped through the Service's Hurricane Sandy project are located in eight States: Connecticut, Delaware, Maryland, Massachusetts, New Jersey, New York, Rhode Island, and Virginia. Draft maps for the Hurricane Sandy project are anticipated to be released for public review starting in 2017. Three CBRS units located in Delaware (Units DE-07, DE-07P, and H01) are included in the pilot project and four CBRS units located in Rhode Island (Unit RI-04P, RI-05P, RI-06, and RI-07) were comprehensively remapped in 2014. Therefore, these seven units will not be remapped through the Hurricane Sandy project.
- <sup>11</sup> There is increasing scientific information on this topic. For example, see the following sources:
- Sutton-Grier et al. 2015. Future of our coasts: The potential for natural and hybrid infrastructure to enhance the resilience of our coastal communities, economies and ecosystems. *Env. Sci. & Policy*, 51: 137-148.
- Scyphers et al. 2015. Natural shorelines promote the stability of fish communities in an urbanized coastal system. *PLoS ONE* 10(6):e0118580. doi:10.1371/journal.pone.0118580.
- Nel et al. 2014. Natural hazards in a changing world: A case for ecosystem-based management. *PLoS ONE* 9(5): e95942. doi:10.1371/journal.pone.0095942.
- Barbier et al. 2013. The value of wetlands in protecting southeast Louisiana from hurricane storm surges. *PLoS ONE* 8(3): e58715.
- Spalding et al. 2013. Coastal ecosystems: A critical element of risk reduction. *Conservation Letters*, May/June 2014, 7(3), 293-301.
- Arkema et al. 2013. Coastal habitats shield people and property from sea-level rise and storms. *Nat Clim Change* 3: 913-18.
- <sup>12</sup> Data.gov is the central repository for data created by Federal agencies. Data.gov was created in 2009 as a way to make the government more transparent by making Federal data available to the public. The website is managed by the GSA, and at the time of this report there were nearly 195,000 individual datasets available on the site, which can be accessed at: <http://www.data.gov>.
- <sup>13</sup> NOAA's Digital Coast website, which was created in 2007, provides coastal data, information, and tools for coastal practitioners. The site was created primarily for the coastal management community and its data is most relevant to that audience. The Digital Coast can be accessed at: <https://coast.noaa.gov/digitalcoast>.
- <sup>14</sup> ArcGIS Online is a cloud-based tool that allows users to create maps and share data, and includes ready to use maps and data layers. Data and maps can be accessed through the website or added directly to ArcGIS Desktop. ArcGIS Online can be accessed at: <https://www.arcgis.com/home>.