Building the Gulf

Recommendations for Ensuring Restoration Benefits for Communities and the Environment

The Nature Conservancy
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The CorpsNetwork
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BFA Environmental Consultants
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Oil from the BP spill coats beach and shoreline along Alabama's Gulf of Mexico coastline.

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Introduction

As the Gulf Coast region begins an historic investment in repairing its coast, it faces a significant new opportunity: it can tap into the local workforce as it prepares the next generation of environmental stewards and restoration professionals. By integrating workforce development into ecosystem restoration, the region can measure success not just in acres of habitat restored, but by how workers in the communities that suffered the most from environmental degradation are connected to in-demand, living-wage jobs restoring that habitat. This is a moment to tackle the Gulf Coast's largest ecological challenges while building new ladders of economic opportunity for local workers.

This work will require the collaboration of all the actors involved in ecosystem restoration: federal, state and local agencies, along with private sector contractors, educational institutions, and workforce and community agencies. By developing partnerships, leveraging funding, and integrating initiatives, these actors can prepare local workers for new careers planning, constructing, and administering restoration projects. By tackling both environmental and economic objectives, stakeholders can build more resilient and prosperous communities. Policymakers at the state and federal level have taken important steps to make such efforts possible, but new partnerships and collaboration are needed to move these policies towards implementation.

In October 2014, Oxfam America, The Nature Conservancy, and the Corps Network convened experts at a workshop in Gulfport, MS, to identify challenges and opportunities in integrating workforce development into future ecosystem restoration projects. The meeting pulled together experts from various sectors across all five Gulf Coast states, including:

- Federal and state environmental and natural resource agencies
- Engineering and construction companies involved in restoration
- Workforce and educational agencies
- Conservation and community development organizations

In discussions and presentations, they examined current ecosystem restoration training efforts, as well as hurdles in working together to build workforce development into future projects. In the end, this interdisciplinary group identified a set of best practices and key learnings.

The goal of this report is to provide stakeholders with an overview of promising models and key steps for incorporating local training and hiring into restoration. Among the key findings:

- Avoid setting economic and environmental goals in opposition;
- Work with employers and workforce agencies to identify in-demand restoration careers;
- Leverage additional sources of funding for preparing workers in restoration skills;
- Develop a hands-on curriculum with industry-approved credentials and pathways to living wage jobs;
- Work with community partners to identify those most in need of economic opportunity, and go where they are to help overcome barriers; and
- Form coalitions and partnerships across sectors, to track outcomes, and ensure efforts build off one another.

These recommendations should serve as important next steps and a critical foundation for future collaboration by restoration and workforce-development stakeholders to create new economic opportunities for local workers and to train the next generation of restoration professionals.

Workers in Louisiana use a marsh washer to flush out oil following the BP oil spill.

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Workers from Alabama State Lands, USFWS and The Nature Conservancy use marsh buggies to guide a set of concrete reef balls into place at Helen Wood Park.

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Background

While the five Gulf Coast states are significantly different from one another, they do share a number of environmental, economic, and social challenges. Each one faces an array of environmental threats: from extreme weather (hurricanes, with high winds and flooding), to sea level rise and land loss, to diminishing water quality and habitat loss for commercially important species.[1] And each state depends on the health of their natural resources to support key industries (such as commercial and recreational fishing, and tourism).[2] In just one example, multi-generational small businesses connected to the fishing industry provide jobs and incomes that are key economic drivers in many communities up and down the coast—from Port Isabel, TX, to Apalachicola, FL.[3]

At the same time, these states regularly rank among the nation's leaders in rates of poverty, low-wage work, and unemployment; according to recent studies, they also have among the lowest levels of economic mobility for those born into low-wage circumstances.[4] Not incidentally, these states also feature high percentages of African Americans, Native Americans, Latinos, and non-English-speaking Vietnamese and South Asians; this brings additional hurdles for people seeking access to resources and economic opportunity.[5]

These environmental and socio-economic factors overlap in communities along the Gulf, making certain communities highly vulnerable to the impacts of natural disasters. While social factors such as poverty and race do not determine who will be hit by a disaster, they do determine a population's ability to respond and recover.[6] Low-income families, women, and minority populations all tend to suffer the greatest challenges from a disaster, which again was witnessed during the BP oil disaster.[7] Workers in industries connected to natural resources, like commercial fishing, also tend to suffer challenges in disasters, especially in environmental disasters.

On a positive note, these states have an array of community and educational resources at their disposal. In addition to featuring extensive expertise in the science of ecosystem restoration, the region is home to many community-based job training institutions, industry associations, and other workforce development assets; these could be easily engaged in a workforce development strategy to prepare a more skilled local workforce and help low-wage families climb out of poverty. In particular, the region's many community colleges are an important resource.[8]

Almost five years after the explosion of the Deepwater Horizon oil platform in April 2010, the Gulf Coast is finally starting to see large-scale ecosystem restoration investments move forward. Initial agreements by Transocean and BP tied to violations of the Clean Water Act and the Oil Pollution Act, and the passage of the RESTORE Act have led to funds flowing to federal, state, and local agencies and organizations for restoration.[9] While many questions remain about the final size of ecosystem restoration investments (as they are connected to the final penalties and fines determined in the legal battle with BP and its business partners), the Gulf Coast will ultimately

1 http://www.nature.org/ourinitiatives/regions/northamerica/areas/gulfofmexico/rebuilding-our-economy-restoring-our-environment.pdf
2 Ibid.
3 http://www.oxfamamerica.org/explore/research-publications/a-way-of-life-at-risk/
4 http://www.c2es.org/docUploads/gulf-coast-impacts-adaptation.pdf
5 http://www.oxfamamerica.org/explore/research-publications/beyond-recovery-moving-the-gulf-coast-toward-a-sustainable-future/
6 Ibid.
7 http://www.oxfamamerica.org/explore/research-publications/a-way-of-life-at-risk/
8 Note on ANNEX of community colleges.
9 For a guide to different oil spill related resources see http://eli-ocean.org/gulf/guide-to-other-funds/

Former fishermen now employed as welders in Mississippi.

MARY BABIC/OXFAM AMERICA

To date, The Nature Conservancy has engaged several groups that work with under-represented communities on habitat restoration and scientific monitoring projects. Local communities and workforces along the Gulf of Mexico, and in particular communities experiencing poverty, should have opportunities to benefit economically and environmentally from restoration efforts. Job training and placement programs can significantly help to get these populations engaged in restoring and protecting the natural resources that they often depend on for their livelihoods.

American Recovery and Reinvestment Act of 2009 The Conservancy was awarded eight projects representing $24.5 million in public investment in coastal habitat protection. The Recovery Act projects were focused on funding "natural infrastructure" projects that created new jobs and saved existing ones, and spurred economic activity and investments in long-term growth. Two of the projects awarded to TNC were located in the Gulf of Mexico. The Alabama Recovery Act Project was funded for $2.9 million and paid for over 72,000 labor hours and the Louisiana Project ($4 million) funded 52,000 labor hours over the course of three and four years respectively. Collectively, these projects funded a variety of local workers from sectors of the community including scientific, engineering, seafood, maritime, and general laborers in order to construct approximately 5 miles of oyster reefs in critical bays and estuaries.

Boat People S.O.S. As part of the Recovery Act project in Alabama, savings from contractor ingenuity and efficiencies produced a surplus of funds that allowed for the expansion of the project by over 50%. The Conservancy hired local seafood workers and fishermen of southeast Asian descent that were identified by Boat People S.O.S. to bag oyster shells for over six weeks before the Christmas holidays.

Gulf Conservation Corps Through National Fish and Wildlife Foundation's Gulf Environment Benefit Fund, the Conservancy was awarded approximately $2.6 million for the Coastal Streams and Habitat Initiative to conduct conservation action planning on nine coastal streams along Mississippi's diverse coast. Through private funding, the Conservancy was able to contract with the Gulf Conservation Corps to hire a team of eight locals to conduct environmental stream assessments in order to understand the baseline conditions and to inform the conservation planning process. Through subsequent contracts, the Conservancy plans to continue frequent and regular stream assessments with the Gulf Conservation Corps in Mississippi.

rank as one of the largest ecological restoration endeavors in our nation's history.

This multi-billion dollar restoration effort will not only repair the value of critical ecosystems that support key industries like fisheries, tourism, and waterway transportation, but will also bring tens of thousands of new jobs connected to planning, constructing, and administering the projects. Economic research shows that 17-39 jobs are created for every million dollars invested in restoring ecosystems.[10] Research by the Mather Economics project has revealed that 57,697 jobs would be created over the life of Gulf Coast Ecosystem Restoration.[11] These jobs span a range of occupations and educational levels, including a large number of decent wage jobs accessible to workers with less than a four-year degree. These jobs generally pay average- or above-average wages, certainly much better than service and hospitality related jobs prevalent across the region. These are the kinds of jobs where a worker could pursue job training and, with some on-the-job learning, have access to a new career and likely an increased paycheck. As ecosystem restoration moves forward, these types of jobs will be in greater demand. As we will explore in this report, many of these careers are already in high demand in the local labor market.

While it may seem obvious that restoration and recovery jobs should employ displaced local workers, this has not always been a goal for these kinds of projects. After Hurricane Katrina, billions of dollars flowed into the region to help rebuild; however, local businesses and workers were often excluded from these opportunities.[12] Similarly, in the initial response to the BP spill, fishermen and others most impacted by the incident were at first excluded from many

10 http://www.nature.org/ourinitiatives/regions/northamerica/areas/gulfofmexico/rebuilding-our-economy-restoring-our-environment.pdf

11 http://www.waltonfamilyfoundation.org/environment/gulfjobsreport/

12 http://www.pogo.org/our-work/reports/2006/co-kc-20060828.html

To date, several policy efforts have attempted to advance programs to train and hire local workers within ecosystem restoration work, including:

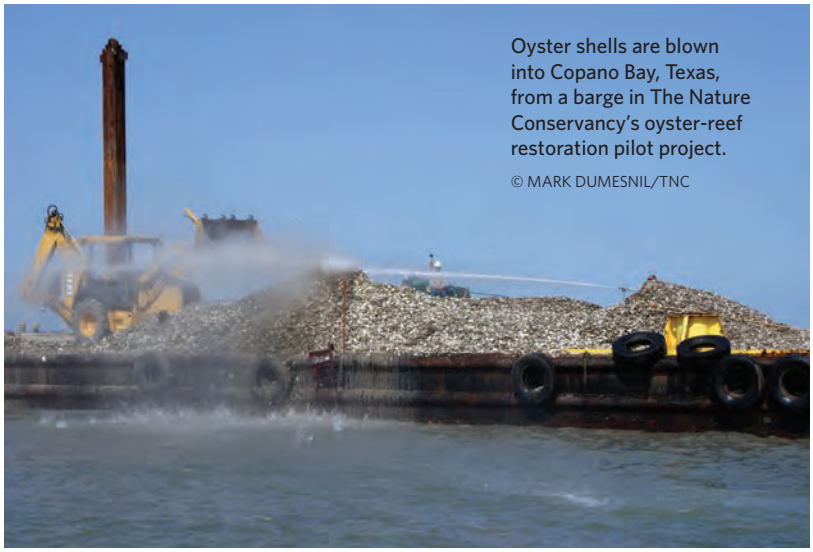
The RESTORE the Gulf Coast States Act This legislation dedicates 80 percent of all Clean Water Act penalties paid by those responsible for the 2010 oil disaster directly to Gulf Coast restoration efforts; it also mandated the creation of the Gulf Coast Ecosystem Restoration Council to develop and implement a comprehensive ecosystem restoration plan. The plan includes several provisions which support the hiring and training of local workers in restoration projects funded under the Act.

Workforce Funds under State Component and Oil Spill Impact Component Under the RESTORE Act, state and local governments are given funds to spend on a number of eligible uses, including "workforce development and job creation." This provision was intended to provide funding to nonprofit, university, and community college-based workforce, career, and technical training programs.

Support within the Comprehensive Plan Component Congress encouraged the Gulf Coast Ecosystem Restoration Council to look at how training and ecosystem restoration fit together under the Comprehensive Plan, and urged the Council to "includ[e] recommendations for ecosystem restoration-related workforce development and job creation programs."[1]

Initial Comprehensive Plan The Council made a commitment to "support ecosystem restoration that builds local workforce capacity" and outlined an objective to "Promote Natural Resource Stewardship and Environmental Education" including through supporting professional development and training. The Council asked agencies to highlight how projects benefit the human community, including how projects specifically benefit local workforce development, in their initial proposals.

1 Senate Report 112-100



Oyster shells are blown into Copano Bay, Texas, from a barge in The Nature Conservancy's oyster-reef restoration pilot project.

© MARK DUMESNIL/TNC

of the economic opportunities created in clean-up efforts. It has become clear that more needs to be done to create new initiatives, policies and partnerships to connect local workers with in-demand jobs.

The Gulf Coast has an enormous opportunity to do things differently this time around. It is possible to invest in large-scale ecosystem restoration projects that make communities stronger and more resilient, and to incorporate job training for the new decent-wage, in-demand jobs along the coast. New partnerships and efforts to train and connect workers can be an important way restoration gets results for local communities. The following section will examine some existing programs and partnerships, as well as the key points identified at the workshop, for how stakeholders can best promote such efforts going forward.

Local Hiring Preferences The RESTORE Act allows states to develop preferences when awarding grants and contracts—to local companies and companies agreeing to hire local workers or partner with local workforce institutions.[2] Also, the law gave the Council a duty to develop common terms to be included in grants and contracts, to promote the use of local workers and partnerships between contractors or grantees with local training institutions.[3]

First Hire Laws in Mississippi,[4] Louisiana,[5] and Florida[6] Three states recently passed laws to encourage state contractors on infrastructure, disaster, and/or oil spill recovery related projects to consider hiring workers referred by state and local employment agencies for newly-created jobs. In each state, contractors using state monies connected to the oil spill recovery have an obligation to review local workers before making new hires.[7]

21st Century Conservation Corps The Corps, an initiative of the Department of the Interior, builds on existing partnerships with youth conservation corps across the country to help young people—including low-income, underserved, and at-risk youth, as well as returning veterans—gain valuable training and work experience while accomplishing conservation and restoration work on public lands, waterways, and cultural heritage sites.

2 For more information on the topic of local preferences see http://www.oxfamamerica.org/static/media/files/Contracting-Preferences-Restore-Act-Oxfam-America_1.pdf
3 Senate Report 112-100
4 Miss. Code Ann. § 31-5-37
5 Section 1. Chapter 26 of Subtitle III of Title 39 of the Louisiana Revised Statutes 10 of 1950
6 Title XVII, Chapter 255 of FL State Law
7 http://www.oxfamamerica.org/explore/research-publications/contracting-preferences-for-restore-act-funded-projects/

Best Practices in Integrating Community Benefits in Ecosystem Restoration Planning

As part of the expert convening hosted by Oxfam, The Nature Conservancy, and the Corps Network, participants were asked to identify best management practices for integrating jobs and training into ecosystem restoration planning. The practices identified at the event included steps to be taken by a range of stakeholders and decision-makers from state and federal agencies involved in administering the RESTORE Act, to other entities like federal, state, and local workforce agencies, private sector contractors, community-based nonprofits, and educational entities like community colleges. Below describes some of the most important suggested best practices:

AVOID SETTING ECONOMIC AND ENVIRONMENTAL GOALS IN OPPOSITION.

In the national and local political debate around recovery from the BP oil spill, the two objectives of economic and environmental restoration have, at times, been unnecessarily set at odds. The RESTORE Act was developed to support both economic recovery and environmental restoration. Now, the Gulf Coast Ecosystem Restoration Council and the Gulf Coast states have a chance to show how the two objectives can be mutually supportive.

While the individual components under the RESTORE Act have particular defined uses (including limiting funding under the Comprehensive Plan component to fund ecosystem restoration), this does not mean, for instance, that environmental projects cannot also be vehicles for yielding new career pathways for local, at-risk workers to good paying jobs.

The Council member agencies have an opportunity to incorporate on-the-job learning opportunities for local workers within habitat restoration as part of the plans for ecosystem projects the agencies sponsor.[13] By including a role for conservation corps or other local job training initiatives to provide students to work on projects while they gain new skills, agencies can implement their planned projects in a way that creates new on-ramps to economic opportunity.

Strong examples exist across federal agency efforts, including the successful partnership of conservation corps across the country and agencies like NOAA and the U.S. Forest Service, which utilize corps groups as contractors to complete various restoration and maintenance tasks. Another model could be agencies incorporating apprenticeships for recent graduates of job training programs for local workers on projects. Limitless Vistas, Inc., a New Orleans-based nonprofit, has developed a series of agreements with public agencies and businesses to provide apprenticeships. These are each examples of how Council member agencies can accomplish their environmental objectives and create new benefits for local communities and working families, at little to no additional cost.

WORK WITH EMPLOYERS AND WORKFORCE AGENCIES TO IDENTIFY IN-DEMAND RESTORATION CAREERS.

For sector-based workforce development efforts to be successful, private sector employers involved in ecosystem restoration must play a critical role.[14] In

13 http://www.restorethegulf.gov/sites/default/files/Initial%20Comprehensive%20Plan%20Aug%202013.pdf

14 http://www.cows.org/_data/documents/1489.pdf

Byron Encalade, president of the Louisiana Oystermen Association, works to organize oystermen and respond to the BP spill.

Limitless Vistas, Inc. (LVI), a nonprofit organization based in New Orleans, LA, has been training local at-risk youths in the skills needed for environmental jobs for the past six years, primarily around environmental remediation. To date, they have trained more than 350 youths, and are seeking new ways to connect them to environmental careers and skills. With the potential for hundreds of millions of dollars coming to the Gulf Coast in the next few years for ecosystem restoration projects, LVI decided to adapt its training efforts to prepare graduates for restoration jobs. With support from Oxfam America, LVI recently developed a new curriculum to train students in skills related to monitoring and coastal restoration.

To this end, they forged an agreement with AECOM (a Fortune 500 company ranked by Engineering News-Record as the number one design firm in the U.S.) to develop a training program for jobs in the environmental restoration industry. This includes familiarizing them with on-the-job construction practices and safety standards, informing them about projects likely to be constructed in the near future, and introducing them to prospective construction contractors.

"We've been talking about the chronic need for proper youth job training with local environmental resource managers for years," says Patrick A. Barnes, a professional geologist, President of BFA Environmental, and founder of LVI. "We're delighted that AECOM has responded with a desire to provide project access in the Gulf Coast and to allow students from LVI's training program to shadow their environmental field personnel over the next year." Barnes and representatives from the Corps Network and American Youth Works worked out the agreement with AECOM, which will ultimately include restoration projects across all five Gulf States.

"AECOM is committed to finding ways to ensure that our projects bring benefits to both the environment and the people of the Gulf Coast," says Dr. Steve Mathies, AECOM's vice president for coastal protection and restoration. "LVI is paving the road toward training and placing those who have suffered the most with jobs and projects that will benefit everyone."

the end, it will be private sector construction, engineering and professional service firms who will be implementing most projects and doing the hiring. They are also the best source of information on hiring needs for specific projects in terms of skills, certification and preparation.

The appendix provides analyses of several common ecosystem restoration projects, along with projections of skilled workers and related preparation needed to complete various types of restoration work. This analysis is based on a series of interviews with local construction and engineering firms conducted by BFA Environmental.[15] This survey identifies a range of skills and occupations involved in restoration, spanning a wide array of educational and preparation backgrounds from entry level to advanced degree. Noticeably, many of the jobs could be considered middle-skilled jobs, requiring post-secondary education but less than a four-year degree. Many occupations are common across a range of common restoration projects, including: survey, environmental and engineering technicians, deckhands, inspectors, welders, landscapers, heavy equipment operators, and commercial divers.

Businesses and industry associations, working with natural resource planners, can also play an important role in evaluating future workforce needs in the restoration sector.

Workforce Investment Boards, the local implementers of the federal Workforce Opportunity and Innovation Act, can also play an important role.[16] These agencies, together with state employment agencies, keep projections of the most in-demand occupations in local labor markets.[17] Some in-demand jobs within local labor markets are also highly needed for future ecosystem restoration projects. Workforce development

15 See Annex
16 http://www.doleta.gov/wioa/
17 Examples like http://www.laworks.net/Downloads/LMI/20062016Occ_DemandListRLMA3.xls

efforts should focus on occupations that are in-demand now, that will likely play an important role in future restoration projects, and that offer above-average wages. Across many of the Gulf's local labor markets, for instance, deckhands, welders, and survey and engineering technicians are in high demand and offer above-average salaries already.[18]

In one example, Louisiana recently completed a Memorandum of Understanding issued between the Louisiana Workforce Commission, Louisiana Community and Technical College System, and the Louisiana Coastal Protection and Restoration Authority, along with private sector leaders, to keep in communication about linking skills training and hiring needs. Other Gulf Coast states should follow this example and take a leadership role in aligning discussions between industries and agencies involved in restoration, workforce development, and education to identify which in-demand occupations and restoration-related skills employers need most along the coast. The Council should support such local efforts.

18 http://recoverrestorerebuild.files.wordpress.com/2012/05/job-creation-report-oxfam-ssa.pdf

LEVERAGE ADDITIONAL SOURCES OF FUNDING FOR PREPARING WORKERS IN RESTORATION.

Given the limited resources under the Gulf Coast Ecosystem Restoration Council, worker training efforts to prepare locals to work on its projects will require additional funding sources for skills training.

"Buckets 1 and 3" of the RESTORE Act provide states and local governments with an opportunity to invest in training the next generation of restoration professionals. Stakeholders should also look beyond the RESTORE Act to other sources of funding to support workforce development partnerships.

One important resource will be federal and state workforce development funds. The Workforce Innovation and Opportunity Act, the federal Department of Labor's primary funding source for workforce development, can be an important tool in funding skills training. Under the Act, local Workforce Investment Boards—regional entities which administer funds to help local workers, especially youth and unemployed workers—provide resources for training workers for jobs in in-demand occupations. As mentioned earlier, local WIBs identify in-demand occupations based

Conservation Corps employees conduct a stream assessment in Mississippi.

Fisherman Lloyde Duncan of Venice, LA, has fished all his life.

Oxfam America has been working to help build a pathway for workers from socially vulnerable communities to secure employment restoring coastal Louisiana. In 2012, they worked with industry officials and local legislators to pass the Louisiana First Hiring Act; the law requires contractors for coastal restoration projects to submit information on the types of jobs anticipated and the methods they will use to recruit local workers.[1]

After the bill was passed, Oxfam developed a multi-stakeholder planning effort, the Louisiana Coastal Workforce Development Committee, bringing together state natural resource and workforce agencies, community colleges, and contractors to coordinate next steps to align industry needs with the necessary training for potential employees from socially vulnerable communities to be prepared for good paying jobs. As a part of this effort, the Louisiana Coastal Protection and Restoration Authority, Louisiana Workforce Commission, and the Louisiana Community and Technical College System signed a memorandum of understanding committing the state's workforce, educational, and restoration agencies to coordinate and identify workforce needs and ways to leverage available resources to fill these needs going forward, as the state embarks on a $50 billion, 50-year restoration plan.[2]

As a first step, the Bayou Region Workforce Training Pilot Program was launched. The program tackles the need for training in Terrebonne, Lafourche, and the surrounding parishes to connect unemployed and underemployed locally-stationed minorities and women, with the immense workforce demands along the coast, including upcoming restoration projects.

The pilot seeks to train 100 people of color and women in the transferable skills sets and credentials needed to participate in the upcoming influx of coastal restoration jobs within the region. Oxfam and the Urban League of Greater New Orleans will work with local church, government, school, and community leaders to recruit participants and train potential employees in developing the soft skills needed to succeed.

The Louisiana Workforce Commission will work with eligible applicants to enroll them in the state's online employment system and refer them to a counselor at Fletcher Community College to apply for training. Training and job placement activities will be closely monitored and evaluated.

1 http://www.oxfamamerica.org/press/louisiana-first-legislation-connects-local-workers-to-protection-and-restoration-jobs/

2 http://coastal.la.gov/a-common-vision/master-plan/

on employment forecasts, and, in fact, many of the common middle-skilled jobs in ecosystem restoration are classified as in-demand jobs across most of the WIBS in the Gulf Coast region. This means workers who qualify for WIOA funds can access skills training, preparing them for these fields.

For instance, Oxfam and the Urban League are working with the Workforce Investment Board in Houma, LA, to train welders and commercial drivers to aid in restoration projects.

Other parts of the federal government also provide resources for skills training. The EPA, for example, maintains some funding for job training through its Environmental Training Grant Program, which has focused on providing residents of environmental justice communities with skills to be involved in brownfields remediation. Some Gulf Coast EPA grantees, such as LVI, are even leveraging these funds to begin adding curriculum related to coastal restoration.

In another example, the Economic Development Administration provided funding to the Gulf of Mexico Foundation to create a Habitat Restoration Technology Training Center in Galveston, TX, to train specialists in restoration.[19]

Of course, job training often requires more than hard skills training. A number of successful models exist for how community-based organizations can help provide workers with training for soft skills like improving resume-writing and interviewing, interpersonal skills and problem-solving, and case management assistance to help workers overcome hurdles to accessing new education and job opportunities like substance abuse issues, childcare, and transportation. This type of work does not always receive public financing through WOIA or other sources and often requires support from philanthropy and private sources. Stakeholders should work to ensure resources are available to provide these important services, helping connect disadvantaged workers to these jobs and training opportunities.

Workers guide a set of concrete reef balls into place at Helen Wood Park in Alabama.

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DEVELOP HANDS-ON CURRICULUM WITH INDUSTRY-APPROVED CREDENTIALS AND PATHWAYS TO LIVING WAGE JOBS.

When designing a job training program connected to restoration, the workshop identified a number of common themes across successful existing training programs. Since many of the skills involved in ecosystem restoration are well suited for hands-on training, successful training programs often involve on-the-job or field training. Research shows students tend to retain more material and stay more engaged with hands-on learning experiences.[20] Spending time in the field and working with the equipment and tools of the trade can help students, especially older or non-traditional students, to succeed.

19 http://www.gulfmex.org/5329/gulf-of-mexico-foundation-to-build-restoration-training-center-in-galveston/

20 Service-Learning and Engagement, Academic Challenge, and Retention Gallini, Sara M.; Moely, Barbara E. http://quod.lib.umich.edu/m/mjcsl/3239521.0010.101/—service-learning-and-engagement-academic-challenge?view=image

Programs should also set out to offer numerous, stackable credentials. Offering a series of training modules that result in industry-supported credentials can equip students with new skills, and provide proof to employers of knowledge and experience.[21]

It is important for businesses and industry associations to keep in communication with community colleges and other training providers to ensure that students are receiving the preparation they need most on the job site. Partnerships between industry and community colleges are critical to design curriculum and to share hiring needs.

Another key strategy is to design training that provides stackable, portable credentials. This enables students to seek training for shorter-term credentials with value to future employers, and to continue to build on these skills to access better paying jobs. Learning institutions and businesses can work together to identify career pathways defined by a series of classroom training and work experience milestones that result in gaining additional credentials documenting a student's professional growth and readiness for more complicated, higher wage work.[22] Developing a career pathway with stackable, multi-phase credentials involving the most common skills needed on the worksite, in professional service activities commonly done by environmental and engineering technicians, could be a valuable project for Gulf employers and educational institutions to pursue.

Additionally, focusing on transferable skills that are applicable to other local in-demand occupations enables students to find jobs in restoration as well as other projects.

State and federal restoration agencies, working

21 http://www.clasp.org/resources-and-publications/publication-1/Full-Paper-The-Credential-Differential.pdf

22 ibid

A Chauvin, LA, resident stands on the foundation of her former home ruined by a hurricane.

together with regional community colleges and employers should identify ways to develop standard curriculum for in-demand skills across the region. The Council should consider ways it can play a convening role in supporting such efforts.

WORK WITH COMMUNITY PARTNERS TO IDENTIFY THOSE MOST IN NEED OF ECONOMIC OPPORTUNITY, AND GO WHERE THEY ARE TO HELP OVERCOME BARRIERS.

In the Gulf Coast, many communities face high levels of poverty and low-wage work. Providing job training to youths, low-income, and minority workers can help to provide new pathways out of poverty and into the workforce.[23] Additionally, a number of areas of the Gulf are home to high numbers of veterans, who often face hurdles in entering private sector employment after duty. Since many coastal industries have also been impacted by the oil spill, workers in fields such as hospitality and commercial fishing may be good candidates for restoration jobs.[24]

Disadvantaged workers, especially in more rural parts of the coast, often face greater barriers to accessing education and training. Lack of transportation, incompatibility with current work schedules, low income, low English proficiency, or unreliable, unaffordable childcare can each be significant hurdles for students seeking training at community colleges or other facilities.[25] Non-traditional students may often require additional assistance to access and complete training. Nonprofits, churches, and community-based social service agencies can provide the kind of assistance needed to help students.

23 http://recoverrestorerebuild.files.wordpress.com/2012/05/job-creation-report-oxfam-ssa.pdf

24 http://www.oxfamamerica.org/explore/research-publications/beyond-recovery-moving-the-gulf-coast-toward-a-sustainable-future/

25 http://www.aecf.org/m/resourcedoc/aecf-CreatingOpportunityforFamilies-EMBARGOED-2014.pdf

THE CORPS NETWORK - GULF COAST RESTORATION INITIATIVE

***The Gulf Coast Restoration Initiative* (GCRI) is developing and strengthening the capacity of Service and Conservation Corps across the Gulf Coast. Under this initiative, The Corps Network (TCN) partnered with The Nature Conservancy to launch a 5-week GCRI pilot project to collect baseline water quality and ecological data for the National Fish and Wildlife Gulf Environmental Benefit Fund and Mississippi Department of Environmental Equality Coastal Stream and Habitat Restoration and Management Initiative. This pilot project is a first step in building a workforce skilled in water monitoring and environmental field techniques. The GCRI is developed in a partnership with the Walton Family Foundation.**

To support the GCRI pilot project, The Corps Network developed a partnership between Texas Conservation Corps (TxCC), an existing member of TCN, and CLIMB CDC, a nonprofit workforce development organization based in Gulfport, MS, and TCN's first member Corps in Mississippi. During this pilot project, TxCC is helping mentor CLIMB CDC regarding operations of a Conservation Corps crew. Corps members participating in this unique opportunity are graduates of CLIMB CDC's Workforce Training Institute.

During the first week of the GCRI pilot project, an eight-person crew, consisting of six Corps members from the local community (plus two crew leaders from TxCC), received training in water monitoring techniques, boating, and water safety. Over the following four weeks, the crew traveled throughout Hancock, Harrison, and Jackson Counties to sample water quality, aquatic invertebrate and fish populations, and evaluate the condition of aquatic ecosystems associated with the coastal streams. Following the project, Corps members will understand how to analyze the physical and chemical properties of soil, sediment, and water samples; know how to identify native and invasive species; be able to use and apply GPS technology; understand basic construction and boat safety; and understand how to assess the health of a coastal ecosystem.

Community-based nonprofits can play an important role in job training regionally, thanks to their experience guiding people through assistance programs, their knowledge of local needs, and the trust of local residents. Solutions to restoration workforce development should develop appropriate roles for nonprofits.

State and local government, philanthropy, and other resources should be identified to support such community efforts.

FORM COALITIONS AND PARTNERSHIPS ACROSS SECTORS, TRACK OUTCOMES, AND ENSURE EFFORTS BUILD OFF ONE ANOTHER.

Successful efforts will involve a range of institutions. It will take the expertise, capacity, and collaboration of numerous organizations to build successful future restoration job training efforts: from community-based nonprofits and community colleges, to businesses and industry associations and local workforce agencies, to natural resource agencies themselves.

Models exist for developing more formal cooperation between agencies. Identifying roles and responsibilities and methods of regular communication will be important to forming effective partnerships. Stakeholders should work to identify and convene local partners and allies to discuss on-going worker training partnership efforts and their challenges and successes.

When possible, worker training partnerships should prioritize documenting outcomes and impact to understand what they mean for working families on the ground. Common indicators of success should be developed for organizations and agencies to attempt to track and quantify their impact for local workers on topics like the numbers of workers trained, the credentials attained, how many found jobs, and how their family income is impacted. In terms of public policy, state agencies are already tracking how local residents are placed in restoration contract work. This data should be made public along with data on job training efforts. Local stakeholders should analyze public data on the successes and challenges faced by job training efforts in the region, and use the data to improve workforce development efforts in the future.

While developing regional partnerships will be important to meet the specific local demand, take advantage of local resources, and connect with local workers, Gulf Coast stakeholders should also work to communicate about challenges and successes, sharing learning and ensuring that future efforts coordinate and build off of each other. Given the limited availability of resources, coordination and learning can help to identify successful models and hopefully find ways to bring them to scale across the region going forward. Workforce development and restoration stakeholders should develop a community of practice to share learning, provide updates on emerging initiatives, and develop new forms of engagement at the regional level.

Conclusion

Coastal restoration projects across the Gulf Coast will employ thousands of workers. With proper planning, members of the Gulf Coast Ecosystem Restoration Council, together with other key stakeholders, can promote new regional efforts to identify, prepare, and place local workers into new, good paying jobs in ecosystem restoration. Doing so will take new collaboration across sectors: restoration agencies partnering with workforce institutions to allow on-the-job learning opportunities, industry and workforce entities identifying skills needs, new financial resources emerging from governments and the private sector, community colleges developing necessary curriculum, community groups connecting workers with new opportunities, and everyone working together to monitor and improve such efforts along the way. As planners of projects and agencies involved in procurement, natural resource agencies at the state and federal level—though some have not traditionally taken on such work—have an opportunity to play a catalytic role in promoting new career pathways for local, disadvantaged workers in restoration jobs working with these other critical stakeholders.

The 17,351-acre Powderhorn Ranch in Calhoun County, one of the few remaining large tracts of intact native coastal prairie and wetlands on the Texas coast, will become a state park and wildlife management in the wake of a cooperative effort between The Conservancy, The Conservation Fund and the Texas Parks and Wildlife Foundation.

Hydrological Restoration

For decades, coastal habitat along the Gulf Coast has been seriously degraded as a result of complete or partial blockage of water flow in significant watersheds. Estuarine ecosystems are created by the natural ebb and flow of seawater interacting with freshwater. The location, salt content, volume, exchange, temperature, and velocity of water, as well as flooding frequency, all influence coastal ecosystems and the way they function. Hydrological restoration seeks to alter how waters flow, to protect and restore habitat; it is a common type of restoration project along the Gulf of Mexico.

Examples of Hydrological Restoration Construction Phase

Recent examples include the Fowl River Watershed Restoration and the D'Olive Watershed Restoration in Alabama, which were funded under the National Fish and Wildlife Foundation's Gulf Benefit Program.

The work plan below represents a hypothetical project designed to restore degraded streams and install management measures to reduce the downstream impacts in a Gulf Coast watershed through a combination of storm-water retrofits, stream restorations, and detailed monitoring. Stabilization of these waterways will significantly reduce sediment loading; this will improve the quality and clarity of the water necessary for re-establishing submerged aquatic vegetation (SAV) beds, which provide critical nursery areas for important species of shellfish and finfish.

Project Task	Description/Scope of Work	Activity	Occupation	Full-Time Equivalent (FTE)	Hourly Pay Range	Minimum Education, Experience, or Credential
Typical construction activities for hydrological restoration	Activities include stream stabilization and restoration, installation of in-stream and storm-water control structures, erosion and sediment control. Typical structures used for hydrological restoration include: grade control structures, flow deflection/concentration structures and bank protection structures Appropriate staff credentials for watershed-restoration construction professionals in Alabama, including credentials in engineering, surveying, construction management, erosion and sediment control, storm-water management, and vegetation management.	Stream restoration grading and in-stream structure installation Storm-water conveyance and retention structure installation Apply Best Management Practices (BMPs) during soil disturbing activities to reduce soil erosion and sediment. Placement of rock, log and structures in channels for grade control and stabilization	Construction managers	1	$30–$40	B.S., license, and 10 years' experience
			Field inspectors (construction supervisor)	1	$25–$30	A.A., training and experience
			Civil engineers	1	$40–$50	B.S., license, and 10 years' experience
			Professional land surveyor	1	$30–$40	License and 10 years' experience
			Surveying technician	2	$15–$18	H.S. with training
			Construction equipment operator	1	$25–$35	H.S. with training
			Laborer	2	$10–$12	Training
			Cement mason/ concrete finisher	1	$20–$25	Training and experience
			Carpenter (formbuilding / formsetting	1	$20–$25	Training and experience
			Welder	1	$12–$25	Training and experience or certification

Project Task	Description/Scope of Work	Activity	Occupation	Full-Time Equivalent (FTE)	Hourly Pay Range	Minimum Education, Experience, or Credential
Stream bank stabilization using bioengineering techniques	Soil bioengineering techniques use living plant material to provide streambank stabilization. It consists in applying engineering design principles with biological and ecological concepts to construct living plant communities to control erosion and flooding. It may include one or a combination of the following methods: branch packing, brush layering, brush mattress, coconut fifer log, erosion control fabric, hay bale breakwater, joint planting, jute-mat log, live cribwall, live fascine, live post, live siltation, live stake, log breakwater plant mat, plant roll, root wad, rooted stock, snow fence, terrace crib, tree and log revetment, trench pack and vegetated geogrid.	Construct and install soil bioengineering structure(s)	Civil engineers	1	$40–$50	B.S., license, and 10 years' experience
			Field inspectors (construction supervisor)	1	$25–$30	A.A., training and experience
			Forest and conservation workers	1	$25–$30	B.S. and experience
			Landscaping and grounds-keeping workers	1	$12–$15	Training
			Laborer	2	$10–$12	Training and experience
			Light equipment operator	1	$18–$25	Training and experience
			Motorboat operators	1	$15–$20	H.S., and experience
Alternative vegetation Management (possible task)	Management of vegetative land cover to control erosion from stormwater runoff. It may include a reforestation program.	Plant and maintain vegetation to control runoff volume in designated areas	Landscape architects	1	$25–$30	B.S., license
			Forest and conservation workers	1	$25–$30	B.S. and experience
			Landscaping workers	1	$12–$15	Training
			Field inspectors (construction supervisor)	1	$25–$30	A.A., training and experience
Adaptive management during and following construction	Adaptive management techniques should be applied to respond to actual conditions in the field and learn from the response of the system as the restoration project progresses. Activities included in this flexible management technique include: assessment, design, implementation, monitoring, evaluation, and adjustment activities. For example one recommended adaptive management action is the inspection of vegetation and channel stability after major storms, with observed problems being immediately repaired. Another one is to manage overland erosion post construction	Inspect and assess vegetation and channel stability. Implement repairs and modify design as needed. Monitor and control erosion during and after construction.	Construction managers	1	$30–$40	B.S., license, and 10 years' experience
			Civil engineers	1	$40–$50	B.S., license, and 10 years' experience
			Field Technician	2	$12–$15	Training and experience

APPENDIX

Living Shoreline Construction

Across the Gulf Coast, thousands of miles of shoreline are experiencing the joint challenges of loss of critical habitat and rise of erosion. Living shorelines, in lower energy situations, are a way to provide long-term protection, restoration, or enhancement of vegetated shoreline habitats through strategic placement of plants, stone, sand fill, and other structural or organic materials.

Living Shoreline Treatments are an alternative to structures like bulkhead, which sever the natural processes and connections between uplands and aquatic areas. The living shoreline approach can employ plants, sand, oyster shell (often in bags), organic materials (e.g., biologs made of jutte), concrete (castles) material-filled structures, or other recycled or natural structural materials (e.g., fossil shell, granite, concrete) to provide shoreline protection. If properly constructed, these treatments enhance upland (landward) eroding of invaluable habitats, such as marshes and mangroves. Living shorelines typically work better in lower energy habitats than in those that have higher wave energies.

Examples of Living Shoreline Construction

Recent examples include the Hancock County Living Shoreline in Mississippi and the Florida Pensacola Living Shoreline as part of Natural Resource Damage Assessment's Early Restoration Phase Three.

The work plan below represents the construction of a length of living shoreline in the nearshore environment along a Gulf Coast bay. This consists of constructing and deploying artificial oyster reef structures made of oyster cultch and/or other substitute materials in strategic locations.

Project Task	Description/Scope of Work	Activity	Occupation	Full-Time Equivalent (FTE)	Hourly Pay Range	Minimum Education, Experience, or Credential
Mobilization and demobilization	Supply approved artificial cultch material and mobilization/demobilization for project area Cultch material shall be transported to deployment areas on barges that are loaded to conform to the depth of the water at the deployment site. Use of tugboats and barges	Transport cultch material to project area	Tugboat captain	1	$25–$35	License
			Tugboat/barge deckhand	2	$10–$12	H.S. w/training
Deployment of cultch material	Placement of cultch material in required deployment area(s). The installed cultch material shall be evenly distributed Standard excavator bucket is allowed for cultch placement	Supervise deployment	Ship Engineer	1	$27–$40	Training and experience or certification
		Install cultch material	Bucket excavator/Bob cat operator	1	$25–$30	H.S., training and experience
		Maneuver barge	Barge captain	1	$20–25	License
		Assist in deployment activities	Deckhands	2	$10–$12	H.S.
Verification of deployment location and minimum water depths over the reef	Use a professional surveying technique with the use of an electronic depth finder and GPS, or a surrounding pole and GPS, or a lead weight and GPS the precise location of each individual bucket load of material deployed Measurements must be taken at specified locations.	Conduct surveying to verify deployment location and minimum depths over the reef	Survey technician (hydrographic)	1	$15–$18	H.S., training and experience
		Support for surveying personnel	Motorboat operator	1	$15–$20	H.S., training and experience

Project Task	Description/Scope of Work	Activity	Occupation	Full-Time Equivalent (FTE)	Hourly Pay Range	Minimum Education, Experience, or Credential
Debris retrieval	Retrieve any and all debris that is expelled during the deployment. The contractor shall provide a vessel and personnel for this task.	Debris retrieval	Deckhand	2	$10–$12	H.S.
		Transport debris	Tugboat captain	1	$25–$35	License
Construction inspection by contracting agency	A representative from the contracting agency will be onsite to monitor the terms of the contract, such as inspecting the cultch material and verifying the distribution of the cultch material during the deployment, and to delineate the deployment site	Monitor the terms of the contract	Field inspectors (construction supervisor)	1	$25–$30	A.A., training and experience
		Conduct survey to verify position of cultch material	Survey technician (hydrographic)	1	$15–$18	H.S., training and experience
		Transport inspection personnel	Motorboat operator	1	$15–$20	H.S., training and experience
		Inspection of cultch material	Inspectors, testers, sorters, samplers, and weighers	1	$12–$18	H.S., training
Assembly and installation of contained or precast concrete oyster reefs Installation	In projects with contained cultch reefs or precast concrete oyster reefs In addition to the activities identified above assembly activities such as weld rebar, bag shells and cast molds could occur. The installation activities include diving and monitoring, positioning units, spraying shells and operating machinery	Assembly - weld rebar	Welder	N/A		
		Assembly - bag shells,	Laborers	N/A		
		Assembly - cast molds	Molding and casting workers	N/A		
		Installation – diving and monitoring	Commercial divers	N/A		
		Installation – operation of machinery	Heavy equipment operator	N/A		

APPENDIX

Marsh Creation Construction

Coastal wetlands and marsh are among the most productive and threatened habitats across the Gulf Coast region. They provide important ecosystem services that are vital to the health and well-being of our nation. They serve as buffers, protecting coastal areas from storm damage and sea-level rise. They are vital to the health of commercially and recreationally important fisheries, providing food and shelter for essential fish and shellfish. Wetlands also serve as nesting and foraging habitat for birds and other wildlife. As "living filters," wetlands improve water quality by removing pollutants, nutrients, and sediments.

Examples of Marsh Creation Project Design

Projects that create marsh are a significant component in restoration efforts across the Gulf. Recent examples of these projects include the Marsh Island Restoration in Alabama and the Lake Hermitage Restoration in Louisiana, both of which were funded under the Natural Resource Damage Assessment Early Restoration Phase One.

The work plan below covers activities involved in creating brackish marsh through dredging sediment, pumping through a pipeline, and creating earthen terraces. Over time, natural dewatering and compaction of dredged sediments should result in elevations within the intertidal range, which would be conducive to the establishment of emergent marsh.

Project Task	Description/Scope of Work	Activity	Occupation	Full-Time Equivalent (FTE)	Hourly Pay Range	Minimum Education, Experience, or Credential
Mobilization and demobilization	The contractor shall provide all labor and equipment necessary to move personnel, equipment, construction materials, and incidentals to and from the project site. This shall include but is not limited to establishing offices, buildings, and other facilities necessary for the work.	Moving equipment, supplies, and personnel to and from the project area	Tugboat captain	1	$25–35	License
			Barge captain	1	$20–$25	License
			Airboat operator	1	$18–$25	License
Construction surveys for additional cells and project work areas	Commencement of work: A pre-construction survey shall be performed to serve as a baseline for fill quantities. Process surveys are conducted during construction for quality control, partial payment, and acceptance. As-built surveys are post-construction surveys to be performed after the completion of all work. Survey of containment dike fill and hydraulic dredging fill areas.	Conventional boundary and topographic survey	Survey crew member	4	$12–$15	H.S. w/training
			Survey technician	2	$15–$18	H.S. w/training
			Professional land surveyor	1	$30–$40	License
			Airboat operator	1	$18–$25	License
Hydraulic dredging and earth-moving construction activities, including construction, gapping, and re-grading of containment dikes	Includes activities associated with installation of the dredge slurry pipeline and maintenance of the dredge slurry pipeline corridor and materials, including but not limited to fencing, excavation, crushed aggregate placement, timber placement, temporary or permanent pipeline warning signs, navigation aides, and pipeline markers. (cont'd on next page)	Project management and supervision	Construction managers	2	$30–$40	B.S., license + 10 years' experience
			Engineer (civil)	1	$40–$50	B.S., license + 10 years' experience
			Ship engineer	1	$27–$40	Training and experience or certification
			Field inspectors (construction supervisor)	2	$25–$30	A.A., training and experience

Project Task	Description/Scope of Work	Activity	Occupation	Full-Time Equivalent (FTE)	Hourly Pay Range	Minimum Education, Experience, or Credential
Hydraulic dredging and earth-moving construction activities, including construction, gapping, and re-grading of containment dikes (cont'd)	Activities also include assembling the materials needed to construct dredge slurry pipeline crossings. Hydraulic dredging for shoreline restoration consists of excavating and satisfactorily placing dredged material at the designated areas in accordance with these Specifications and in conformity to the lines, grades, and elevations shown on the project plans or as directed by the project engineer. Hydraulic dredging for marsh creation consist of excavating and satisfactorily placing dredged material at the designated marsh creation fill sites, along with construction/installation of marsh fill/shoreline restoration settlement plates and earthen terraces. The Contractor may be required to temporarily construct degrade, or gap containment dikes to better control effluent discharge. The Contractor shall furnish all of the materials, labor, and equipment necessary to construct and maintain the containment dikes to the greatest extent possible until the fill areas have been accepted and completed according to the project plans and specifications. Earthen containment dikes shall be gapped or degraded to the same elevation as the marsh creation fill site platform upon completion of the project	Project management and supervision (cont'd)	Inspectors, testers, sorters, samplers, and weighers	2	$12–$18	Training and experience
		Marine vessel operations in support of hydraulic dredging and earth-moving construction activities	Dredge tender operator	1	$25–$30	License
			Leverman	2	$15–$20	H.S. w/training and experience
			Deckhand	1	$10–$12	Training
			Marsh buggy dragline operator	1	$25–$30	License, training and experience
			Marsh buggy dragline oiler		$18–$20	Training and experience
		Operation of heavy construction equipment to perform hydraulic dredging and earth moving activities.	Derrick operator	1	$25–$30	License, training and experience
			Dozer operator(heavy equipment operator)	1	$25–$30	License, training and experience
			Pile-drive operator	1	$20–$30	License, training and experience
		Other construction and assembly activities	Structural iron- and steelworkers		$30–$40	Training, experience and certification
			Welder	1	$12–$25	Training and experience or certification
			Carpenter (formbuilding/formsetting)	1	$20–$30	Training and experience
			Millwright	1	$25–$30	Training and experience
			Cement mason/concrete finisher	1	$20–$25	Training and experience
			Light equipment operator	1	$18–$25	Training and experience
		Other activities performed to support construction activities, such as maintenance and repair of mechanical equipment, preparation of foods and marine vessel housekeeping, transportation of construction materials and equipment, and diving operations.	Heavy equipment mechanic	1	$25–$35	Training and experience or certification
			Oiler	1	$12–$18	Training or experience
			Electrician	1	$20–$30	License or certification
			Handyman	1	$15–$25	Training and experience

Marsh Creation Construction (cont'd)

Project Task	Description/Scope of Work	Activity	Occupation	Full-Time Equivalent (FTE)	Hourly Pay Range	Minimum Education, Experience, or Credential
Hydraulic dredging and earth-moving construction activities, including construction, gapping, and re-grading of containment dikes (cont'd)	See Description/Scope of Work on previous page	Other activities performed to support construction activities, such as maintenance and repair of mechanical equipment, preparation of foods and marine vessel housekeeping, transportation of construction materials and equipment, and diving operations. (cont'd)	First cook	1	$12–$15	Training and experience
			Laborers	4	$10–$12	Training
			Janitor, cabin person	1	$10–$12	Training
			Truck drivers (heavy and tractor-trailer)	1	$25–$35	License
			Commercial divers	1	$35–$40	License

Marsh Creation Design

Coastal wetlands and marsh are among the most productive and threatened habitats across the Gulf Coast region. They provide important ecosystem services that are vital to the health and well-being of our nation. They serve as buffers, protecting coastal areas from storm damage and sea-level rise. They are vital to the health of commercially and recreationally important fisheries, providing food and shelter for essential fish and shellfish. Wetlands also serve as nesting and foraging habitat for birds and other wildlife. As "living filters," wetlands improve water quality by removing pollutants, nutrients, and sediments.

Examples of Marsh Creation Project Design

Projects that create marsh are a significant component in restoration efforts across the Gulf. Recent examples of these projects include the Marsh Island Restoration in Alabama and the Lake Hermitage Restoration in Louisiana, both of which were funded under the Natural Resource Damage Assessment Early Restoration Phase One.

While many of the most labor-intensive portions of ecosystem restoration take place in the construction phase, designing and engineering a restoration project involve a significant number of workers. The five Gulf Coast states have many projects in various stages; it's likely that design work will continue to be an important part of restoration work, especially in the near future. The work plan below covers activities in the planning, designing, and permitting phase of a project that was conceived to restore saltwater marsh habitat connected to a barrier island.

Project Task	Description/Scope of Work	Activity	Occupation	Full-Time Equivalent (FTE)	Hourly Pay Range	Minimum Education, Experience, or Credential
Design and engineering services	Includes geotechnical, hydrological, environmental, ecological and historical investigations, topographic and bathymetric surveys, and engineering analyses. It also includes the preparation of design drawings and bid documents.	Engineering analysis	Civil engineer	2	$35–$45	P.E., 10+ years' experience
		Geotechnical investigations	Civil engineering technicians	2	$20–$25	B.S.
		Hydrological investigations	Hydrologist	1	$20–$25	B.S.
		Topographic and bathymetric surveys	Survey technician	3–4	$12–$15	H.S. w/training
		Historical investigations — archeological assessment — Section 106	Archeologists	1	$25–$30	B.S., 5 years of experience

Project Task	Description/Scope of Work	Activity	Occupation	Full-Time Equivalent (FTE)	Hourly Pay Range	Minimum Education, Experience, or Credential
Design and engineering services (cont'd)	Includes geotechnical, hydrological, environmental, ecological and historical investigations, topographic and bathymetric surveys, and engineering analyses. It also includes the preparation of design drawings and bid documents. (cont'd)	Environmental investigations, geotechnical, hydrological, environmental investigations, sediment analysis, engineering analysis, preparation of design drawings and bid documents	Civil engineer	1	$25–$30	B.S. + 2–3 years' experience
			Civil drafters	2	$18–$25	H.S. w/training
		Ecological investigations	Biologists	1	$20–$25	B.S.
		Sediment analysis	Sample test technicians	2	$12–$20	H.S. w/training
Request for technical proposals for breakwater attenuation technology	Issue request for proposal and documents, and review and select proposals.	Review and select proposal for breakwater technology	Civil engineer	1	$35–$45	P.E., 10+ years' experience
Project design finalization	Prepare final design drawing and construction bid documents, issue request for construction bids, review and select bids for construction services	Prepare final design drawings and construction bid documents Review and select bids for construction services	Civil engineer	1	$35–$45	P.E., 10+ years' experience
		Prepare final design drawings	Civil Drafter	1	$18–$25	H.S.
Permitting	Prepare documents for permit(s) application(s) and perform additional studies, if requested.	Maritime archeological survey (per specific permit request)	Archeologists	1	$25–$30	B.S., 5 years of experience
		Submerged aquatic vegetation survey (per specific permit request)	Environmental engineers	1	$25–$30	B.S.
Construction oversight	Construction coordination, monitoring and inspection, and engineering services	Construction coordination, monitoring and inspection and engineering services	Civil engineer	1	$35–$45	P.E., 10+ years' experience
		Ecological investigations (monitoring and inspection)	Biologists	1	$20–$25	B.S.
		Support field investigations	Commercial divers	1	$30–$35	H.S. + certification
		Support field investigations	Motorboat operators	1	15$–$20	H.S. + certification

APPENDIX

Oyster Reef Monitoring

Ecological monitoring and observation will be an important part of Gulf Coast ecosystem restoration. From project-specific monitoring to measure the progress of specific investments to more system-wide approaches (like stock assessments), there will be a significant uptick in monitoring activities as projects move forward. While numerous specialties and processes are involved in monitoring the progress and state of different environmental features, monitoring activities do entail some commonalities; they often employ workers with a range of skills, from highly trained scientists to less-credentialed technicians supporting those scientists. Monitoring may present a significant opportunity for creating career on-ramps for local workers.

Example of Oyster Reef Monitoring

The work plan below represents one increment of a hypothetical project designed to monitor the ecological impact of oyster reef restoration within the existing footprint of the oyster reefs in a Gulf Coast estuary. It describes the crew needed to conduct monitoring activities after completion of the restoration project.

Project Task	Description/Scope of Work	Activity	Occupation	Full-Time Equivalent (FTE)	Hourly Pay Range	Minimum Education, Experience, or Credential
Standard construction and as-built monitoring	Standard construction and as-built monitoring activities include: side-scan sonar and sub-bottom profiling of cultch plants; oyster metrics and secondary productivity sampling.	Material placement with side-scan sonar	Geophysical data technicians	1	$25–$30	B.S., 2–3 years' experience
		Sub-bottom profiling	Motorboat operators	1	$25–$30	Licensed
		Dive assessments	Commercial diver	1	$30–$40	B.S., 2–3 years' experience
As-built ecological monitoring	Ecological construction and as-built monitoring activities include: preparation for seasonal oyster metrics and secondary productivity, review of side-scan sonar data , deployment of sample trays and basket in the project area	Project lifetime assessment and oyster metrics	Zoologists and wildlife biologists	1	$25–$35	B.S., 2–3 years' experience
		Secondary productivity sampling; calculate secondary productivity in cultch areas	Zoologists and wildlife biologists	1	$25–$35	B.S., 2–3 years' experience
		Deploy sample trays and baskets	Inspectors, testers, sorters, samplers, and weighers	2	$12–$20	H.S.
Long-term ecological monitoring	Long-term ecological monitoring post-construction activities include the preparation of long term monitoring plans and selection of monitoring sites. It also includes the collection and analysis of the collected data, such as side-scan sonar data.	Plans in review and monitoring sites in review	Biologists	1	$25–$35	B.S., 2–3 years' experience

Oyster Reef Restoration

Even prior to the oil spill, the massive oyster reefs that once dominated the country's coastal estuaries had been decimated by decades of over-harvesting, disease, pollution, and declining habitat. Globally, 85 percent of reefs have been lost, making oyster reefs the most severely impacted marine habitat on earth. Oyster harvesting provides a critical opportunity for creating livelihoods for fisherman across the five Gulf Coast states. One method of restoring oyster reefs involves enhancing the quantity and quality of cultch material on existing oyster reefs and at potential new reef sites.

Examples of Oyster Reef Restoration

Recent examples include the Restoration & Enhancement of Oyster Reefs in Alabama under the National Fish and Wildlife Foundations Gulf Environmental Benefit Fund and the Mississippi Oyster Cultch Project under the Natural Resource Damage Assessment Early Restoration Phase One.

The work plan below represents one increment of a hypothetical project designed to restore and enhance oyster cultch within the existing footprint of the oyster harvest areas of a Gulf Coast estuary. It describes the crew needed to deploy thousands of cubic yards of cultch material (oyster shell, limestone or crushed concrete, or some combination thereof) by a barge to multiple sites.

Project Task	Description/Scope of Work	Activity	Occupation	Full-Time Equivalent (FTE)	Hourly Pay Range	Minimum Education, Experience, or Credential
Mobilization and demobilization	Source and verify availability of suitable cultch material Furnish essential materials, equipment, and personnel to the project site and remove upon completion.	Transport cultch material, equipment and personnel	Tugboat captain	1	$25–$35	License
			Tugboat deckhand	2	$10–$12	H.S. w/training
Deployment of cultch material	The deployment will be performed utilizing a grid pattern so as to accomplish a uniform distribution of the cultch material Cultch material will be washed overboard using a minimum of three high-pressure hoses. This high-pressure jet of water is directed against the cultch in such a manner as to spray them in a thin, even layer for a given distance from the barge. Throughout the operation, the barge must be maneuvered over the deployment location in such a way that the cultch will cover the entire area to the needed density. The contractor must have equipment and personnel capable of unloading a minimum of specified volume of suitable cultch material in an hour, once on site, and have the sufficient equipment and crew capable of handling a minimum volume per day per project's specifications. Requires the use of multiple pumps, spray nozzles, and hoses to unload a barge per project specifications.	Supervise deployment	Ship Engineer	1	$27–$40	Training and experience or certification
		Maneuver barge	Barge captain	1	$20–25	License
		Material deployment	Spray hands (manipulating high-pressure hoses to scatter rock)–laborer	4	$10–$12	H.S. w/training
			Equipment operator (deck)	1	$12–$15	H.S. w/training
			Equipment operator (bobcat)	1	$12–$15	H.S. w/training

APPENDIX

Oyster Reef Restoration (cont'd)

Project Task	Description/Scope of Work	Activity	Occupation	Full-Time Equivalent (FTE)	Hourly Pay Range	Minimum Education, Experience, or Credential
Debris Retrieval	Retrieve any and all debris that is expelled during the deployment. The contractor shall provide a vessel and personnel for this task	Debris retrieval	Deckhand	2	$10–$12	H.S.
		Transport debris	Tugboat captain	1	$25–$35	License
Standard construction monitoring	Staff onsite to monitor the terms of the contract, such as the distribution of cultch material, and to delineate the deployment site	Construction inspection	Inspectors, testers, sorters, samplers, and weighers	2	$12–$18	H.S. w/training
			Field inspectors (construction supervisor)	1	$30–$40	Licensed contractor
		Conduct survey to verify position of cultch material	Survey technician (hydrographic)	1	$15–$18	H.S., training and experience