The Green Bay Natural Resource Damage Assessment is perhaps still the most comprehensive, detailed, and public damage assessment in U.S. history. There are important lessons that can be gleaned from its legacy.

DETERMINING THE BOTTOM LINE: FIGURING THE HEART OF THE DAMAGE ASSESSMENT

The central purpose of the Green Bay damage assessment was to determine the extent and importance of the PCB problem. The assessment brought to light historical documentation of the amount of PCBs released into the Lower Fox River by paper companies. The assessment decoded voluminous data about how PCBs moved from the Fox River into and throughout Green Bay, and for how long. The assessment sifted through information about ecological injuries and exposure of fish and wildlife consumed by anglers and hunters. It both eliminated and substantiated various injuries via further investigations and analyses. The assessment measured
the importance of injuries and losses to the public, both relativistically and in absolute terms as costs and values.

In the decades preceding the assessment, many people had speculated about the cost of PCB cleanup, but nobody knew what amount of cleanup could be justified. The original purpose of the Fish and Wildlife damage assessment was to establish the value to the public of reducing ongoing PCB-caused injuries via sediment restoration in the Lower Fox River. Information from the early years of the assessment provided sufficient justification for EPA to launch Superfund cleanup over Wisconsin’s objection. That made human health and ecological risk reduction the centerpiece for justifying the appropriate amount of cleanup. However, the completed Fish and Wildlife damage assessment provided important context for EPA decision making because quicker and more complete cleanup reduced natural resource damages in explicit, predictable ways. In the end, the damage assessment showed how much the public preferred quick, complete cleanup.

Early cleanup cost estimates and final damage calculations by Fish and Wildlife were remarkable when compared to the final cleanup settlements reached by 2017. Fish and Wildlife estimated cleanup costs, in its confidential, May 8, 1996 “Preliminary Evaluation of Injuries and Damages,” at about $700 million, which was $1.1 billion in 2017 dollars. Fish and Wildlife calculated cleanup value at $610 million in 1999, which was about $900 million in 2017 dollars. The actual cleanup cost came to $1 billion by 2017.

Fish and Wildlife innovated in several ways to make its calculations. In fact, they created the first ever Restoration and Compensation Determination Plan, or RCDP, under federal regulations.
The RCDP did not use several of the common techniques favored by many trustee agencies because of key factors in the Bay of Green Bay. For instance, it did not compare the amount of specific natural resources, like for instance walleye, that would be lost because of PCBs and gained by restoration projects. PCBs did not obviously reduce the number of walleye. Rather, PCBs caused all of the walleye to have consumption advisories and many of them to experience health effects like liver lesions. The same problem occurred for most of the other injuries in Green Bay. So, the co-trustees did not use the standard technique for direct resource trades: “Resource Equivalency Analysis.”

The RCDP also did not convert all of the losses from PCBs and all of the gains from restoration projects into habitat. Again, Green Bay PCB injuries did not necessarily eliminate habitat, as often occurs with ship groundings and oil spills. Plus, creation of habitat similar to the Bay of Green Bay was impractical, particularly at a scale large enough to offset the injuries. Furthermore, the standard technique, “Habitat Equivalency Analysis,” forced ecological comparisons between dissimilar habitats that quickly outstripped the available science and made litigation of ecologically-based trades in and near Green Bay risky.

Instead, the co-trustees converted each restoration category into values by having people choose between scenarios. Each scenario varied the amount of decreased injuries after PCB cleanup, the amount of increased habitat after restoration, the amount of increased water clarity after restoration, the amount of increased park improvement after restoration, and the amount of future increased taxes. They then analyzed very many choices about scenarios made by many people in order to build an economics model that showed how people, on average, valued each program in terms of the other programs, and in terms of money as taxes.
The co-trustees could then determine how much of each restoration program was enough to offset the PCB-caused injuries. The duration for PCB injuries in the comparisons could be easily altered in the model, depending on the cleanup scenarios favored by EPA and DNR. The cost of enough restoration to offset the PCB injuries was the primary method for calculating total damages.

In addition, the RCDP provided all of the analyses needed to calculate restoration costs realistically. It included a comprehensive list of restoration opportunities throughout the river and bay, which were systematically prioritized under published criteria that came from the regulations. The Plan also included a real estate study that calculated relevant land costs across the assessment area. It also presented the current rates of wetland loss, restoration, and preservation across the assessment area. It presented watershed modeling of how buffer strips along streams and conservation tillage in fields would increase water clarity in the river and bay. It summarized extensive discussions with The Nature Conservancy and multiple land trusts about the best habitat opportunities across the assessment area. It showed how emerging information and opportunities on both the cleanup front and the restoration front could be plugged into the analyses to determine damages credibly.

Finally, the RCDP was the vehicle for the co-trustees to make sense of all of their previous determinations about PCB releases, PCB pathways, PCB injuries, and economic damages. Furthermore, the RCDP served notice to EPA, DNR, and the paper companies that the co-trustees were ready to litigate if necessary. They were well equipped to evaluate how different cleanup scenarios would affect total damages. A slow or incomplete cleanup would certainly increase natural resource damages, and the co-trustees were prepared to prove it. Consequently, co-trustee comments to DNR and EPA on cleanup plans carried much more weight than typical.
The co-trustees also used their results and momentum to emphasize the advantages to EPA and DNR of making the Intergovernmental Partnership authentic, rather than a showpiece to shield each agency from public outrage over interagency discord.

The Restoration and Compensation Determination Plan was, without doubt, the most significant official document published by Fish and Wildlife for the Green Bay damage assessment. It created enormous leverage for Fish and Wildlife, for the co-trustees, and for the Intergovernmental Partnership, once DNR finally stopped fighting the other agencies about it.

FORCING CLEANUP AND RESTORATION DECISIONS

The Green Bay Natural Resource Damage Assessment was more than a number crunching exercise. It catalyzed real cleanup and restoration of the Lower Fox River and Bay of Green Bay, against long odds caused by political opposition and determined resistance from the paper companies. No natural resource trustee had ever attempted to use damage assessment authorities to mimic a major river-wide cleanup by focusing on primary sediment restoration. That focus forced EPA into the case over the objection of Wisconsin, alleviating the need for natural resource trustees to tackle sediment restoration on their own. However, had EPA and DNR remained on the sidelines, Fish and Wildlife and DOJ were prepared to litigate their claims to prevent further injuries throughout Green Bay, caused by the downstream movement of PCB-contaminated sediments from the Fox River into and throughout the bay.

The initial focus of the assessment on “breaking the PCB pathway” between the river and the bay, without the help of cleanup agencies like EPA, was new, bold, controversial, and risky. However, Fish and Wildlife was confident they could prove widespread, long-term injuries of
great significance to the public. That proof was directly and purposely aimed at bringing in the stronger cleanup authorities of EPA and DNR, but it could also have led to a high-stakes trial in federal court that would have set important precedents, win or lose.

As it turned out, the gamble succeeded without need of a damage assessment trial. EPA finally invoked its cleanup authorities, then DNR eventually relented, and at last the paper companies funded comprehensive cleanup and restoration. Fish and Wildlife refused to sidestep legal frameworks. Fish and Wildlife opposed early paper company offers and DNR requests for federally-funded cleanup. These offers and proposals aimed too low, came with too many restrictive strings attached, and shifted responsibility from the paper companies to taxpayers. Instead, Fish and Wildlife catalyzed a $1.1 billion cleanup and restoration paid for by the paper companies.

TOTAL VALUE EQUIVALENCY ECONOMICS STUDY

In addition to the fundamental achievement of complete cleanup and restoration, the Green Bay damage assessment made significant technical breakthroughs through the invention and application of the Total Value Equivalency method at the heart of the RCDP. It directly compared two sides of the essential equation underlying the assessment. Namely, how could losses caused by PCBs be compared, directly and credibly, with gains caused by practical natural resource restoration?

In the Green Bay case, there were several critical complications for making this comparison. First, it was impossible to predict whether cleanup agencies would tackle the most expensive part of the case. Namely, sediment cleanup under EPA authorities could alternatively
be thought of as sediment restoration under damage assessment authorities. Regardless of which authorities were used, the engineering problems and costs would be similar. They would be based on methods like dredging and capping to immobilize PCB-contaminated sediments in the river before being swept into the bay by high river flows. However, those costs, likely most of a billion dollars, could have fallen completely to the trustees, completely to the cleanup agencies, or somewhere in between. Therefore, Fish and Wildlife had to invent a technique for calculating damages under the full range of scenarios, from complete inclusion to complete exclusion of sediment restoration costs.

The second complication was gauging the importance of injuries caused by PCBs in Green Bay. Public losses did not come from visually obvious destruction like massive oil spills or acute poisoning. Rather, subtle but insidious injuries were extremely widespread, covering hundreds of square miles, and very long-lived, lasting many decades. They affected many people and natural resources, including any creature drinking water or eating food tied to any part of the river or bay. This required assessment methods that bundled many different kinds of injury. Consumption advisories, standards violations, and various health effects in diverse species all had to be included. Additionally, the methods had to fairly account for injuries that were simultaneously subtle and dramatic — subtle like invisible organ lesions that did not wipe out the inflicted species, and dramatic like lasting for decades throughout hundreds of square miles. Plus, the methods had to clearly separate injuries linked to paper company PCBs, from others that were not. Fish consumption advisories clearly were, but reproductive failure of lake trout and crossed bills in cormorants were not.

Third, methods had to account for practical natural resource restoration opportunities around the river and bay that did not directly replace the exact same resources that had been
injured by paper company PCBs. Fish, wildlife, and habitats were not destroyed by PCBs. Rather, PCBs caused more subtle injuries, like health effects in some individual fish and wildlife, or contamination that made organisms unsafe for human consumption. Similarly, practical restorations, like wetland restoration and reduced agricultural runoff, would not lead to easily counted new natural resources that could directly offset PCB-caused losses. In fact, simply increasing populations and habitats — where PCBs continued to cause problems — could lead to even more contamination and injury, as long as injurious levels of PCBs continued to flow from the river into the bay.

So, Fish and Wildlife decided to compare gains from restoration with losses from PCBs as the value placed on them by the general public. That is, the whole bundle of PCB injuries could be described to find out how much it was worth to people to eliminate them. Injuries not included could be described, like lake trout reproductive failure and crossed bills in cormorants. Injuries included could be described, like various other health effects in terns, walleye, eagles, and cormorants, as well as standards violations and consumption advisories. The duration of injuries could be described, depending on how much cleanup was accomplished, and how quickly. At the same time, practical restoration opportunities could be described to find out how much they were worth to people. The amount of new wetlands could be described, as well as additional water clarity, and natural resource improvements within parks.

By accurately describing the PCB-caused injuries and the restoration-caused gains, Fish and Wildlife could then use economic studies to see how valuable the losses and gains were to the general public, on average. The values could then be compared, directly as programmatic trades or as money. Unfortunately, economics studies were controversial, especially when responsible parties complained about them.
There is a long history in the U.S. of arguments between natural resource trustees and polluters about the use of economics studies in damage assessments.¹ Many of the arguments are highly technical, such as how to properly word and test survey instruments, and how to ensure adequate response rates. Others are ideological, such as whether stated preference studies (i.e., what people say about how much they would pay) are as reliable as revealed preference studies (i.e., how much people actually spend). However, controversy is exaggerated in damage assessments by the fact that economic studies lead directly to damage calculations, which determines how much responsible parties owe.

Once Fish and Wildlife decided that valuation would be needed to compare losses and gains in Green Bay, they had to contend with both legitimate academic controversies and political ones caused by responsible parties, especially the paper companies. Consequently, Fish and Wildlife devoted very significant budgets to economics studies. They assembled a highly credible team of national experts. They conducted economics studies that followed the established practices of the natural resource economics field, that met the 1993 standards set by the blue ribbon panel of experts convened by the National Oceanic and Atmospheric Administration, and that complied with the federal regulations that guide damage assessments. They tested their results for realism and then used them as the centerpiece for calculating damages.

Two original studies were completed and published, both in formal governmental findings and in the academic literature. The first established about $100 million in recreational fishing losses by focusing only on consumption advisories and active anglers in Green Bay.² The second was the Total Value Equivalency,³ which established a range of damages depending on the amount and pace of cleanup, as well as the mix of restoration options that emerged as the
most practical. Importantly, the study showed that the total value was about double the cost of sufficient restoration, but even those lower cost-based damages were significantly greater than recreational fishing damages alone.

These economic findings were the technical lynchpin of the damages calculated by Fish and Wildlife. They provided leverage that Fish and Wildlife wielded with the paper companies and Wisconsin. The companies and the state attacked the results during confidential meetings, then in public. However, Prof. Richard Bishop of the U. of Wisconsin at Madison, who was at the center of the studies, helped Fish and Wildlife with a very public defense at five public hearings in Wisconsin and Michigan, as well as in many press interviews. Furthermore, the results were published in front line journals and books. Prof. Alan Randall of The Ohio State U. commented in a forward to the 2005 book that included the first academic publication of how the Total Value Equivalency was used by Fish and Wildlife:

“In a later chapter, Lazo et al. succeed in integrating [ecological risk assessment] and [economic valuation] by reversing the order in which they are applied. A particular economic valuation method is used to discover public preferences among an array of broadly defined restoration alternatives, and then [ecological risk assessment] techniques are used to develop more detailed management plans to implement the top-ranked restoration alternatives. Without endorsing their approach in its entirety, we can concede that they might be onto something.”

The innovation and strength of the Total Value Equivalency allowed Fish and Wildlife to construct the highly credible Restoration and Compensation Determination Plan. The Plan formulated the natural resource trustees’ position on damages and tied together the results of the entire assessment. Furthermore, it created enough public and scientific momentum to overcome
Wisconsin’s public attacks on economics methodology and results. This, in concert with Governor Thompson’s departure, accelerated the unraveling of Wisconsin’s deal with Fort Howard and the formation of a finally functional intergovernmental partnership that included Wisconsin.

The technical strength of the Total Value Equivalency, the Restoration and Compensation Determination Plan, and the other formal Fish and Wildlife determinations also contributed to the resolution of the entire case, mostly on the government’s terms. Certainly, the coalescing of the governmental partners, particularly EPA’s powerful response authorities, was even more critical than Fish and Wildlife’s technical work. However, the Total Value Equivalency remains a cornerstone of Fish and Wildlife and governmental success at the site.

Ironically, few trustees in the U.S. gained confidence in economics studies from this success. In fact, most trustees became more aware of Green Bay’s controversies than the role that economics played in its successes. Practitioners of damage assessments usually avoid economics studies because they know that responsible parties will complain, and expenses may be high. Many governmental attorneys and managers continue to be scared off of economics by the controversies that responsible parties foment. In this sense, Fish and Wildlife won the battle at Green Bay but may have lost ground in the war over the proper role of natural resource trustees and the economics assessment techniques available to them.

NEGOTIATION AND LITIGATION STRATEGY
The Green Bay Natural Resource Damage Assessment also broke ground by deploying a sophisticated negotiation and litigation strategy.\textsuperscript{v,vii} It aimed at facilitating four strategic interests to:

1) pressure EPA and Wisconsin to join the intergovernmental partnership to clean up and restore the river and bay;

2) negotiate the terms of paper company participation in the assessment;

3) negotiate the terms of settlements between the governments and the paper companies;

and

4) prepare to litigate natural resource damage claims in federal district court.

Like most trustees facing large damage assessments, Fish and Wildlife focused on preparation for litigation as the ultimate source of its leverage on all fronts. However, the agency also took innovative steps to pursue its various strategic interests in Green Bay. First, it made its assessment public as soon and as completely as practical. Second, it calculated damages in three different ways that could either be combined or pursued independently.

Plaintiffs typically avoid disclosing their strategies and the substance of their emerging case until required by the discovery phase of litigation. In fact, federal natural resource trustees, like Fish and Wildlife, usually take full advantage of privileges under the Sunshine Laws to withhold pre-litigation work products and discussions from public view until the discovery phase of a formally filed case. Furthermore, most trustees delay or avoid the optional public process described in federal regulations in order to avoid premature forecast of information and strategies to responsible parties. Since most damage assessments settle before court, formal damage assessment documents are seldom published by trustees under the regulations.
In Green Bay, Fish and Wildlife broke aggressively from these habits. The agency deliberately reached a wider public and scientific community sooner and more completely than typical. This was essential because Fort Howard and DNR had already dominated the local scene in order to prevent the launch of enforcement mechanisms and litigation, particularly by the federal government. Fish and Wildlife used its public procedures pointedly to convince the public, the scientific community, EPA, and eventually DNR that legally enforceable decisions were necessary and practical. Furthermore, Fish and Wildlife adopted an explicit strategy of using its public process under federal regulations to eventually gain (if litigation had proved necessary) additional deference in court, including but not limited to the “rebuttable presumption” under the Superfund law.\textsuperscript{vii}

Consequently, Fish and Wildlife continually published, from 1994 until 2001, indexes of relevant documents and data, formal assessment planning documents, and formal assessment results.\textsuperscript{viii} Importantly, the materials were carefully released under explicit delegations of authority. Plus, they included the entirety of the trustees’ substantive case, from PCB releases and pathways, to natural resource injuries, to economic damages, to restoration. In addition, until EPA formally joined the case under the Superfund law, Fish and Wildlife included sediment restoration as the key to breaking the link between PCBs in river sediments and injuries throughout the bay. This regularly invited public outcry about EPA’s absence from the case and DNR’s refusal to invoke its own authority under the Superfund law.

The regular and complete publication of data, documents, formal plans, and formal results elevated Fish and Wildlife status and credibility with the local public, press, and scientific community. This translated into leverage with EPA, DNR, and the paper companies. It is probably impractical to determine whether early and complete publication also created
significant litigation problems for Fish and Wildlife since the case settled without a trial. However, the terms of the settlements were very much in line with Fish and Wildlife’s early estimates for cleanup costs, as well as formal calculations of damages, especially recreational fishing damages at the core of the damage assessment case. Furthermore, it is undeniable that Fish and Wildlife succeeded in providing leverage to help convince EPA and DNR to join a viable Intergovernmental Partnership that succeeded on the ground.

Regarding damage calculations, Fish and Wildlife pursued two separate studies that could be combined or pursued independently. Furthermore, Fish and Wildlife used techniques that could calculate damages either as restoration costs, or as the value of PCB-caused losses. This strategy was enormously flexible, which allowed Fish and Wildlife to adapt quickly to different negotiation and litigation opportunities and scenarios.

The central litigation strategy was to calculate recreational fishing damages based on how fish consumption advisories affected active anglers in the river and bay. Critically, advisories were an injury that was both relatively easy to prove and highly consequential to easily identified people actively using the injured natural resource. Furthermore, economics studies of recreational fishing impacts from consumption advisories are common and the techniques used relatively uncontroversial. Therefore, Fish and Wildlife focused on this bright, easily measured signal using state-of-the-art techniques and stellar experts. This centerpiece satisfied the entire legal team that litigation could be successful if needed.

However, fish consumption advisories were not the only kind of injury that could be proved, and anglers were not the only people affected. Therefore, Fish and Wildlife also pursued total damages using the Total Value Equivalency. Damages were calculated both as total value and total cost. That is, damages could be calculated as the total value of all PCB injuries to the
entire public near the river and bay. However, damages could also be calculated as the cost of enough natural resource restoration to offset the losses. In the cost calculation, the amount of sufficient restoration was determined by comparing it directly to the losses. For instance, how many acres of additional wetland restoration were value-equivalent to fewer remaining years of PCB-caused injury?

This gave Fish and Wildlife three ways to calculate damages for negotiations or litigation. Recreational fishing damages came to about $100 million. Total restoration costs came to about $250 million. Total value came to about $500 million.ix Fish and Wildlife also determined that the best way to combine these calculations into a single position for public consideration was to use the Total Value Equivalency cost estimates for future damages, and recreational fishing values for past damages.x Furthermore, Fish and Wildlife presented damage ranges that depended on the amount and speed of cleanup, as well as differing mixes of restoration types.

Public presentation of these results served notice that Fish and Wildlife had credible results that could be used for negotiations and litigation. Furthermore, the flexibility of the techniques showed that Fish and Wildlife had multiple options for negotiation or litigation. For instance, Fish and Wildlife could have litigated the larger Total Value Equivalency values, or presented multiple, alternative claims in case a subset of injury or damage results were rejected by the court. This strategy allowed instant presentation to a wide audience without foreclosing multiple negotiation and litigation strategies. Thereby, Fish and Wildlife increased its leverage on all four strategic fronts.
RELYING ON VAST DATA, STUDIES, AND EXPERTISE BEYOND THE DAMAGE ASSESSMENT

It is difficult to convey the amount of scientific attention that PCBs in the Fox River and the Bay of Green Bay garnered over the decades. The bay became a prime focus for international researchers studying PCB exposure and injuries in birds after the surprising discovery in the 1960s of PCBs in Sister Bay herring gulls. The river had long been a focus of pollution studies by the state of Wisconsin from the 1920s onward because of gross pollution from paper mills along its banks, including PCBs starting in the 1950s. Some of the largest PCB data collections in history resulted from the PCB mass balance studies of the Lower Fox River, Bay of Green Bay, and Lake Michigan funded by DNR and EPA’s Great Lakes National Program Office during the 1980s and 1990s, which linked PCBs in the river and bay.\textsuperscript{xix,xx}

Fish and Wildlife had both a great opportunity and a terrible burden to make sense of these vast data sets, study results, and ongoing discussions by world-class experts and investigators. Disparate purposes, uncoordinated investigations, and conflicting results had to be addressed and interpreted within the legal framework of the Superfund law. Gaps had to be filled, and data had to be validated, combined, and reinterpreted in a damage assessment context. Conclusions had to be reached and official determinations published.

THE GIANT STILL SLUMBERS

The Green Bay Natural Resource Damage Assessment was consequential. First and most importantly, the voluminous details prove that facts and laws matter. The Green Bay case was
built on a mountain of empirical data published in the scientific literature. Properly delegated governmental authorities then applied those data within a systematic regulatory and legal framework with complete public scrutiny. Together, the facts, legal process, and public scrutiny overwhelmed sophisticated, well-financed companies who preferred to avoid paying for the unintended environmental consequences of their businesses. Facts, process, and scrutiny also prevailed over politicians who sought to undermine legal frameworks that they happened to dislike, or facts they found inconvenient. Furthermore, civil servants prevailed within their own bureaucracies by publicly following the facts and legal processes even when facing hostile, skeptical, or apathetic colleagues and command lines. Civil servants at all levels of government and in diverse programs can learn this lesson. Even powerful corporations, politicians, and bureaucrats must face consequential facts and the law when the public and its civil servants require it. Rhetoric, marketing, and showmanship can be successfully countered.

Second, natural resource trustees can create enormous leverage with other agencies and responsible parties, but it requires more than angry comments. Trustees and the public are better served by more complete assessments conducted in the light of day. Particularly at large sites with reluctant responsible parties or inaction by other agencies, trustees should prepare credible cases for potential litigation. Furthermore, trustees should rely on their explicit authorities and public processes to test their case openly. The advantages exceed the straightforward benefits of “good government,” as well as likely disadvantages of prematurely signaling litigation posture. Trustees can create leverage by properly informing and motivating the public about the facts and the law. Furthermore, trustees can focus their assessment on the most credible and convincing facts by informing and responding to the scientific community. Finally, trustees can improve their arguments with the courts, and with the defense attorneys who understand the judicial
system, by proving that they have followed their own delegated authorities, their own expertise, and their own public review process under statutes and regulations. An assessment backed by the public, the scientific community, delegated authority, and public, regulatory process simply carries more weight with everybody who wields authority: courts, attorneys, officers of companies, politicians, and bureaucrats at all levels.

Third and more narrowly, the actual cleanup and restoration of Green Bay during the last two decades vindicates the earlier view espoused by Fish and Wildlife in the 1990s. Cleanup of the Fox River by the paper companies was justified and practical. Fiercely resistant companies, hostile politicians, and reluctant bureaucrats were wrong when they claimed that PCB problems were not worth the high costs to fix them. Nearly everybody in the region mistakenly viewed cleanup and restoration as beyond reach. They underestimated the severity of the PCB problem or overestimated the obstacles to address it. In particular, most people discounted Fish and Wildlife and Justice too severely and for too long while assuming that the paper companies, Governor Thompson, and DNR leaders would ultimately prevail. Skepticism was understandable, especially initially. However, DNR’s official resistance was singularly too pointed and long lasting for a governmental institution that owes more allegiance to the public, the law, and the facts than to political expediency and financial power. In fact, the unhealthy extent of DNR’s submission to Governor Thompson increased and lengthened paper company opposition to cleanup and restoration. DNR officials could and should have shielded themselves from undue influence by wielding more effectively the facts of the site and their own authorities. This failure prevented them from leading the cleanup and restoration, which was certainly within their considerable capability, and it delayed real action at the site by at least a decade.
Finally, the Natural Resource Damage Assessment program of Fish and Wildlife, Region 3 failed to adequately capitalize on its success at Green Bay. Interior and Fish and Wildlife never overcame their inherent reluctance to pursue Superfund litigation. Fish and Wildlife also failed to organize as expertly as the National Oceanic and Atmospheric Administration on a national scale. Instead, Interior and Fish and Wildlife continue, to this day, to rely on haphazardly organized local teams to create partnerships and momentum, which they then fund as practical. This system has had success in places like Coeur D’Alene, Idaho, Hudson River, New York, and Green Bay, Wisconsin. However, Fish and Wildlife did not leverage Green Bay successes into effective programmatic momentum. Regional directors after Bill Hartwig, particularly in Fort Snelling, showed little interest in damage assessments and aversion to their controversy. Fish and Wildlife efforts for Green Bay transformed overnight from leading the effort to supporting EPA and soothing lingering resentment from DNR. Restorations on the ground continue to be celebrated but without highlighting the link to the controversial front end of damage assessments. Consequently, very few people remain at Fish and Wildlife, Region 3 with the expertise, interest, and support to conduct comprehensive damage assessments, particularly within the regional office. Today, it would be at least as difficult as it was in 1992 to create enough organization and momentum within Fish and Wildlife to influence another site as much as Fish and Wildlife influenced the Green Bay matter.

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\footnote{Breffle, W. S., et al. 2006. Combining stated-choice and stated-frequency data with observed behavior to value natural resource damage assessment compensable damages: Green Bay, PCBs, and Fish Consumption Advisories. Handbook on Contingent Valuation (2006) 371.}


Due to a lack of case law, the exact benefit of the rebuttable presumption under the Comprehensive Environmental Response, Compensation and Liability Act and federal regulations at 43 CFR Part 11 is mostly untested. It might only limit the risk of summary judgment for dismissal before trial, or it might give trustee results additional deference. Trustees and Potentially Responsible Parties routinely argue about whether and how completely a “thumb on the scale” would actually materialize for trustees after successfully following federal regulations as envisioned by the statute.

Appendix, Allen 2018b.pdf, Table 6.

Exact numbers required conversion to present value, determining the actual amount and timing of cleanup, and determining the best restoration opportunities on the ground. Furthermore, had EPA and DNR failed to clean up the river, Fish and Wildlife could also have included sediment restoration costs, which came to about $700 million in early Fish and Wildlife estimates that were eventually superseded by the formal EPA and DNR cleanup process.

The Total Value Equivalency survey instrument required respondents to make hypothetical future trades between increased taxes, increased restoration, and increased cleanup that shortened the duration of PCB injuries. Therefore, transferring these Total Value Equivalency results to values for past years would have been controversial. Recreational fishing damages could be applied to past years more easily because of the large number of recreational fishing studies throughout the U.S., which allowed more confident transferring between years using a common technique called Benefits Transfer.


Appendix, Allen 2018d.pdf.