Committee on Resources

Subcommittee on Fisheries Conservation, Wildlife and Oceans

Statement

TESTIMONY OF
DR. KRISTEN MILLIGAN
STAFF SCIENTIST
CLEAN OCEAN ACTION
SANDY HOOK, NJ 07732
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Thank you for this opportunity to testify before the Subcommittee on Fisheries Conservation, Wildlife and Oceans in reference to the effects on living marine resources from dredged material deposited in the New York Bight, including activities associated with the Historic Area Remediation Site (HARS) which is located off the coast of New Jersey.

My name is Kristen Milligan and I am staff scientist at Clean Ocean Action. I have conducted research on the ecology of coastal systems, specifically on effects of disturbance events on the survival and persistence of marine populations. My current research focuses on contamination inputs into the New York Bight Apex from point sources in New Jersey and effects of sediment contamination on aquatic populations. Specifically regarding the issue under discussion today, for the past year I have been critically evaluating the body of technical information on remediation efforts at the Historic Area Remediation Site in the New York Bight.

I will first introduce some general concepts regarding effects of sediment contamination on individuals, populations, and communities in the marine environment. Then, I will review the environmental conditions resulting in the designation of the Historic Area Remediation Site (which I will refer to as HARS) and how the current remediation process will not reduce impacts at this site and will not protect the NY Bight against adverse ecological effects.

Sediment Contamination and Marine Populations

Negative Effects from contamination

Contamination can cause a wide variety of biological effects, including those that negatively affect reproduction and development---biological processes that are essential for maintenance and perpetuation of healthy populations. Exposure to toxins can cause a range of biological effects. The extreme effect is death to effects such as cancer resulting from long-term, chronic exposure to toxins.

Negative effects can be categorized in two ways:

(1) Death from short-term direct contact and exposure with toxins is called "acute toxicity".

(2) "Sublethal effects" occur as a result of toxin exposure, may result in shortened lifespan, and may cause impaired biological or ecological performance. Examples of sublethal effects include: fin erosion, tumors and lesions, liver disease, cancer, reduced growth, reduced reproduction, developmental abnormalities, and genetic mutations.

Acute and sublethal effects happen to individuals. For a population made up of a number of individuals (for example, of winter flounder), the magnitude and extent of ecological effects (such as population decreases) will depend on the number of individuals affected, the life stage affected, and the type of negative effect.

<u>Contamination in the benthic food chain</u>

In the nearshore marine environment, most food-chains involve animals living on and in the sea-floor. These animals living in sediments are called infauna. Infaunal organisms are more likely than other organisms to bioaccumulate contaminants, exhibit effects, and transfer contaminants to higher trophic levels in the food chain. Two reasons why infaunal species are exposed to toxins to the greatest extent are because they actively ingest sediment particles to which toxins are attached and they are directly exposed by dermal contact.

An increase in toxin levels in tissue is called "bioaccumulation" and, depending on concentrations of the toxins in tissue, can result in acute mortality or sublethal effects.

When predators feed on infauna with contaminated tissue, the contaminants can be transferred to and potentially accumulate in the tissue of the predator. This is called trophic transfer. These contaminants can then potentially continue through the marine trophic levels of the food chain, including to human consumers of seafood.

Contamination Conditions at the Historic Area Remediation Site

The Historic Area Remediation Site is a 15.7 square mile area that was concluded by the EPA to be contaminated. It surrounds the original Mud Dump Site, where contaminated dredged material was dumped for decades. In the Supplemental Environmental Impact Statement (USEPA, 1997) finalized in May 1997 for the closure of the Mud Dump Site and the designation of the HARS, the executive summary concludes that remediation is necessary for four reasons:

Contaminant toxicity--data taken in 1994 show acute toxicity in sediment from areas around the Mud Dump Site,

Contaminant Bioaccumulation/Trophic Transfer-- results showed that there were areas in the study area [HARS] where infaunal worms were accumulating undesirable levels of contaminants from the sediments,

Contaminants in Sediments--based on contaminant levels in the sediment, negative biological effects could be possible at many sampling stations, and

Contaminant Levels in Area Lobsters--PCB and 2,3,7,8-TCDD (dioxin) concentrations in the hepatic tissue of the lobsters were above the US FDA consumption guidelines and lobster study data revealed that food sources of Bight Apex lobsters are contaminated, that contaminants are being accumulated, and that concern about potential human-health risks is warranted.

It is worth describing here the contaminants that were specifically found to be elevated in infaunal worms living in sediments at HARS, according to the EPA in the Supplemental Environmental Impact Statement for the HARS designation (USEPA, 1997). These were:

polycyclic aromatic hydrocarbons (otherwise known as PAHs),

polychlorinated biphenyls (otherwise known as PCBs), and

the dioxin compound 2,3,7,8-TCDD.

Only PAHs and PCBs were found to be elevated in HARS in comparison to ocean background levels (those sites that are outside of HARS and presumably not impacted by ocean dumping of contaminated dredged material; refer to Figure 1).

The dioxin 2,3,7,8-TCDD was found to be elevated throughout the New York Bight Apex and not specifically elevated in HARS in comparison to outside HARS. Both inside and outside HARS, dioxin levels exceeded the current acceptable limit of dioxin (i.e., 1 ppt. wet weight).

Even though there are high levels of contamination within HARS, there is a diversity of species that migrate through, inhabit, feed within, and lay eggs in the HARS. The largest percentage of fish species found in the area studied by the Supplemental Environmental Impact Statement (USEPA, 1997) spend most of their lifecycle on or near the bottom and amount to 21 species that are considered by the EPA to be commercially, recreationally, or ecologically important. There are also species of invertebrates including crustaceans dependent on the sea-floor at HARS.

Species are dependent on this environment for reproduction. For example, after spawning, rock crabs (which are abundant near the HARS) carry their eggs until they hatch (Krouse, 1972) and during this time the egg-carrying females bury themselves into sediments.

Species are dependant on this environment for feeding. For example, winter flounder feeds on prey including several species of polychaete worms, found in or on the sediment in which it lives.

The aim of remediation was to reduce the potential human-health and ecological impacts presented by sediments in HARS. Specifically, the Supplemental Environmental Impact Statement (USEPA, 1997; p. 4-31) concludes that when remediation operations are completed, the potential for contaminant bioaccumulation will be reduced as well as the potential for sublethal effects in benthic marine organisms and their predators (including human consumers of fish and shellfish from the area).

Conditions allowed by the EPA in Material for Remediation

The current EPA process, used for determining whether or not material is appropriate cap material for the HARS, tests for acute toxicity and contaminant bioaccumulation. There are no limits for contaminants in sediments. As evident in the attached Table (Table 1) of current EPA Region II guidelines for toxin bioaccumulation in Material for Remediation, the current allowable levels of bioaccumulation will not reduce the elevated levels of bioaccumulation at HARS except for the dioxin 2,3,7,8-TCDD. Thus, with the exception of 2,3,7,8-TCDD, the current standards used will either increase contaminant bioaccumulation at and around HARS or perpetuate the contaminated status-quo in animals dependent on HARS.

It can be concluded therefore that:

Of the reasons why HARS was in need of remediation, the only factors that are being used to select cap material are acute toxicity and dioxin levels in wildlife.

The other factors for designating the site such as PCBs in area lobsters, contaminant bioaccumulation of other chemicals of concern, and toxin levels in the sediments ***are not*** being used as bases by which to select cap material.

The remaining testimony is focused on the failure of the EPA's current evaluation methods to set protective bioaccumulation standards for Material for Remediation.

Standards for evaluating bioaccumulation test results

The EPA requires that bioaccumulation tests be performed on clams and worms in the laboratory. In these tests, these species are grown in both known clean sediment and suspected contaminated sediment. After twenty-eight days, the species are harvested and levels of bioaccumulation are compared between the two types of sediment. If levels of toxins are significantly higher in animals from the suspected contaminated sediments, then those concentrations are examined and interpreted to see if the potential for adverse effects exists.

A new system for interpreting bioaccumulation test results for dredging projects appeared in December 1996 in a Memorandum for the Record for a dredging project known as the South Brother Island Channel, where this material was concluded to be "Category 1" and was to be dumped at the Mud Dump Site before its closure. This system was called the "EPA Region 2/CENAN Framework for Evaluating Bioaccumulation Test Results" and is the same system currently being used to determine whether or not dredged material is suitable Material for Remediation. This new framework utilizes levels of bioaccumulated toxins intended to represent safe or not safe levels for marine organisms and human health. In addition, new levels never before used appeared in this Memorandum for the Record for polycyclic aromatic hydrocarbons (PAHs) and several other toxins. These estimated levels are based on outdated and limited literature searches--for example, one level is based on one research paper on one species of fish, published in 1982. Also, already-existing regional matrix values [levels] for five toxins were inserted into this new framework. In this new system of evaluating bioaccumulation tests, these five regional values are used as screens and if bioaccumulation levels do not exceed the matrix values, no further analysis is required to detect potential for adverse effects.

This entire new framework was developed for the purposes of ocean-dumping dredged material wastes into the ocean and not for the purposes of managing the remediation of the Historic Area Remediation Site (HARS).

These new ocean-dumping guidelines for PAHs would allow levels of contamination in animals living in cap material to far-exceed the levels already deemed elevated within the area to be remediated. The EPA (USEPA, 1997) concluded that PAHs were significantly elevated in the HARS in comparison to ambient background levels in the ocean (where the average PAH level is approximately 104 ppb). The average level found at HARS and reported in the 1997 Supplemental Environmental Impact Statement (USEPA, 1997 and references therein) was approximately 440 ppb (with a 95% confidence interval around this average of _± 117). Prior to HARS designation and beginning in December 1996, the allowable level set by the EPA for total PAHs in animal tissue was 40,000 ppb. This is the level now used to remediate the HARS.

Regional matrix values for mercury, cadmium, DDT and PCBs were developed in 1981, and they were inserted into the new December 1996 framework for ocean-dumping. According to EPA Region II, if bioaccumulation does not exceed these values, then it can be concluded that the levels of bioaccumulation are safe for marine resources and humans. Research since 1981 strongly indicates that these levels are not protective of aquatic resources and human consumers of seafood. In addition, these levels exceed levels found at HARS.

The dioxin regional value of 1 ppt. is also used in the same way as the matrix values in the EPA's new framework, but will not be discussed in this testimony.

At the time of their development, these values [mercury, cadmium, DDT, PCBs] were meant to protect the New York Bight from further degradation. These values were derived to represent the "status-quo" of contamination in animals in the NY Bight and, by extension, were intended to represent levels below which no adverse biological effects could occur. All of these values were intended to be interim values. The 1981 report (USACE, 1981) that derived these values state for each contaminant: "We plan that this matrix [level] will be a dynamic tool which will be frequently reviewed and modified as additional data and more detailed analyses become available."

None of these matrix levels for mercury, cadmium, DDT and PCBs have been modified or reviewed since 1981, despite the fact that much additional information and data are available since then. Of most concern are the following:

Firstly, a large body of information on the current levels of contamination in the NY Bight (e.g. from the studies used in the HARS designation Supplemental Environmental Impact Statement, USEPA 1997) are available but have not been incorporated into these matrix values, and secondly, other information such as updated EPA guidelines for these chemicals as they relate to fish consumption advisories have not been incorporated into these matrix values. Yet these outdated values dating back to a polluted time in the Bight's history are being used to clean-up a contaminated site and would allow levels (as measured in infaunal worm tissue) to increase at the site. For example, the level of PCBs in worms in the ocean background outside of the HARS is 88 parts per billion. The average level of PCBs in infaunal worms at HARS was 209 ppb (the variation around this mean value, as estimated by a 95% confidence interval, is ± 46.4 ppb; USEPA, 1997 and references therein). The EPA's matrix value for PCBs is 400 ppb. It is clear that this permissible level of PCBs in worms will not reduce levels of PCB contamination in food chains at the HARS.

If new information were added, we would see these matrix levels drop dramatically in order to protect against the risk of adverse effects in wildlife, humans, and the NY Bight ecological system and to prevent further degradation in the NY Bight.

In 1997, a peer review was initiated by EPA Region II on this framework and the values used within it. EPA Region II received comments from reviewers in September 1998, but has not responded to the reviewers and has not modified the framework and the values used within it to reflect reviewers' concerns. Meanwhile, the framework is still being used to select Material for Remediation.

Where do we go from here?

Remediation of this site has been mismanaged. Information on how the levels of contamination have changed since the years (1994, 1996, and 1997) when studies were performed for the closure of the Mud Dump and the designation of the Historic Area Remediation Site is not available. Data are not available on the impact of the nearly 1 million tons of material that has been placed at the HARS since September 1, 1997.

The HARS was designated "Impact Category I" under the Marine Protection Research Sanctuaries Act (40 CFR Section 228.10 (c)(1)). "Impact Category I" impacts include bioaccumulation of contaminants in marine biota and changes in sediment composition at or near the dump site. Remediation must reduce these impacts.

The preferred alternative of remediation chosen in 1997 was intended to not only cap acutely toxic sediments but to lower contaminant levels in organisms that inhabit the HARS. According to the EPA (USEPA, 1997; p. 4-35), this remediation alternative would result in the following scenario:

"Organisms such as crabs, lobsters, and demersal fish that currently feed on HARS infauna with high body burdens of contaminants will receive decreasing contaminant exposure as the PRA [priority remediation area] is remediated. This exposure-reduction will be a beneficial effect on Bight Apex organisms, and human beings will have less risk of adverse effects from consumption of Bight Apex seafood."

The framework currently in place for determining Material for Remediation will not accomplish these goals of remediation, especially those for capping toxins that bioaccumulate and reducing contamination levels in animals.

The current guidelines and evaluation framework will also allow levels of contamination to far-exceed levels normally found as "ambient" levels outside of the HARS and in the Bight Apex.

If materials like those that have recently been deemed appropriate cap material are placed at the HARS, they will:

perpetuate the elevated levels of contamination in the sediments at HARS.

Sediment surveys in the NY Bight by EPA in 1993 and 1994 (REMAP and reference site surveys) indicated that most areas outside of HARS have surface sediments have concentrations near or less than 50 ppb. Sediment surveys performed in the HARS in show that PCB concentrations averaged 278 ppb (with a 95% confidence interval around this average of ±_147 ppb; Battelle, 1996). A recently approved remediation project had total PCB concentrations in the mud as high as 981 parts per billion. This level is much higher than levels currently found in the NY Bight and outside the HARS, will not reduce levels of PCBs at HARS, and will only persist the elevated levels of PCBs at this site relative to areas outside of the HARS.

perpetuate elevated levels of bioaccumulation in animals, and persist the potential for adverse biological and ecological effects due to these toxins. For example:

for PAHs: Infaunal worms living in the ocean background outside of HARS show bioaccumulation of 105 ppb total PAHs (as cited in EPA Region II Testing Memoranda for bioaccumulation test results for each project approved for HARS). Worms in HARS show bioaccumulation of 437 ppb total PAHs (with a 95%

confidence interval around this average of ±_117 ppb; USEPA, 1997 and data reports therein). A recently approved project for HARS caused worms to bioaccumulate ***751 ppb*** total PAHs.

for PCBs: According to EPA, background "ambient" levels of PCBs in worms is 88 ppb (as cited in EPA Region II Testing Memoranda for bioaccumulation test results for each project approved for HARS). Worms in HARS have an average of 209 ppb (with a 95% confidence interval around this average of ±_46 ppb; USEPA, 1997 and data reports therein). Recent projects approved for remediation caused PCB bioccumulation of 169 and 175 ppb, which are statistically no different than the elevated levels found at HARS. These levels will only continue the elevated levels of PCBs at this site relative to areas outside of the HARS.

It is clear that the current standards for Material for Remediation will not reduce levels of contamination within HARS. Standards for Material for Remediation must:

reduce levels of contamination in sediments and biota at the site, and

reflect ambient "background" levels found in areas not impacted by dumping, and

protect against adverse effects including through bioaccumulation.

In the absence of such standards, placement of any cap material should be re-considered. An essential key to restoring or remediating an ecosystem is to stop the stress that is causing the ecological problem (National Research Council, 1992). In the case of the NY Bight area, one stress is contamination. The HARS was designated to remediate a polluted portion of the Bight, which was a contributor to toxins in wildlife and human consumers of seafood. Continuing the addition of contaminants to this system will not remediate but perpetuate elevated levels of toxins.

Natural capping will occur over the long-term. The EPA in the Supplemental Environmental Impact Statement (USEPA, 1997) regarding the option of permanently closing the MDS and not opening the HARS states that "Over the long term, deposition of cleaner natural sediments will gradually make the Study Area bioaccumulation potential approach that of the background conditions of the Bight Apex." However, due to a lack of data and predictive models on natural sedimentation rates for this area it is not possible to determine the length of time necessary for the area to be naturally capped.

In conclusion, there is a need and responsibility to remediate this section of the ocean---by reducing the levels of contaminants that are present at the HARS. The method currently employed by the EPA is unacceptable. A remediation plan must ensure safety of habitat and prey to marine life, protect against bioaccumulation through the food-chain, and not further degrade NY Bight habitat and resources. This plan starts with banning elevated levels of contaminants to this ecosystem.

Thank you for this opportunity to present this testimony.

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Figure 1. Map of the Historic Area Remediation Site (HARS) showing location of HARS. The area outside of HARS is known as the "Ocean Background" and refers to the NY Bight area presumably not impacted by dumping of dredged material. The HARS is separated into nine priority remediation zones. Zone 1 in the northwest corner of HARS is the most contaminated. Maps adapted from maps of HARS provided in U.S. Army Corps Public Notices for each remediation project.

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