

GEORGIA SEA GRANT OIL SPILL UPDATE



Outcome/Guidance from Georgia Sea Grant Program: Current Status of BP Oil Spill

By Chuck Hopkinson, Director, Georgia Sea Grant
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On August 2, 2010, the National Incident Command (NIC) released a report on the status of oil from the BP oil spill. The findings of the report are being widely reported in the news media as suggesting that 75% of the oil is “gone” and only 25% remains. However, many independent scientists are interpreting the findings differently, with some suggesting that less than 10% is “gone” and up to 90% remains a threat to the ecosystem. Considering the vulnerability of the southeast Atlantic coast to oil being carried our way by the Gulf Stream, it is critical that we determine which of these interpretations of the report is more accurate.

To address this issue, Georgia Sea Grant organized an ad hoc group of university-based oceanographic experts from within the state to independently evaluate and interpret the conclusions of the NIC report.

This group determined that the media interpretation of the report’s findings has been largely inaccurate and misleading. Oil that the NIC report categorizes as Evaporated or Dissolved, Naturally Dispersed and Chemically Dispersed has been widely interpreted by the media to mean “gone” and no longer a threat to the ecosystem. However, this group believes that most of the dissolved and dispersed forms of oil are still present and not necessarily harmless.

In order to better illustrate to the media, the public, community leaders and political decision-makers the current status of oil in the ecosystem, this group focused exclusively on oil that actually entered Gulf of Mexico waters, omitting from its consideration oil that was directly captured from the wellhead. Our analysis classified oil into categories relevant to discussions of recovery and environmental impact: Burned, Skimmed, Evaporated, Degraded and Remaining.

Thus, starting with the NIC’s figure for how much oil entered the water, we estimated how much oil could have conceivably degraded and evaporated as of the date of the NOAA science report. The balance remains in the Gulf in varying forms and toxicity.

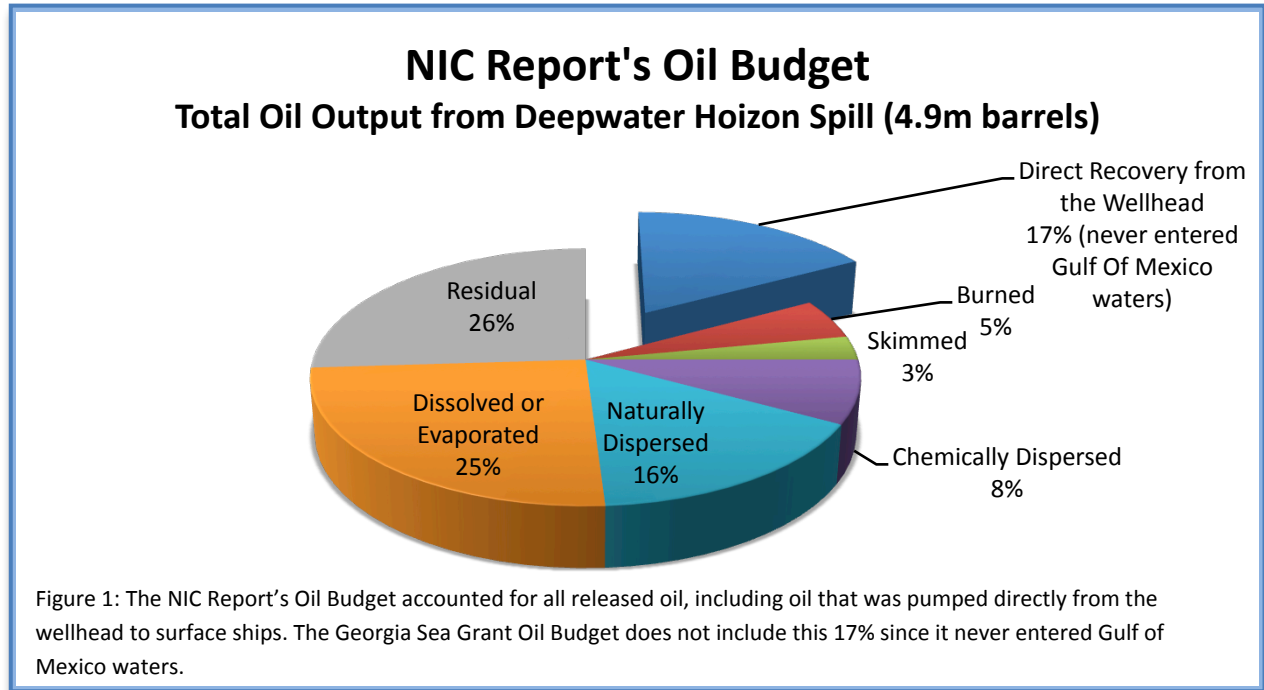
The group also considered how the vulnerability of our Atlantic coast waters has changed since BP capped the well. A listing of participating experts can be found below.

HOW MUCH OIL WAS RELEASED INTO THE GULF OF MEXICO?

There was consensus within the group that, as stated in the NIC report, approximately 4.9 million barrels emerged from the wellhead between the rig explosion on April 20, 2010 and the final capping of the well on July 15 2010.

In accounting for total oil output from the well, the NIC report includes oil piped directly from the wellhead to surface ships and prevented from ever entering the Gulf of Mexico, approximately .8 million barrels (17%) of the total oil output. While we commend BP for capturing this oil at great depth under difficult conditions, our analysis focused exclusively on oil

that actually entered the water and from which the Gulf must now recover. Therefore, we omitted from our discussion and our charts the .8 million barrels captured directly from the wellhead and examined the status of the 4.1 million barrels that actually entered the water. Because of this difference, percentages do not track directly from our charts to those of the NIC, but they are easily reconciled. For example, the 392,000 barrels that the NIC reports as skimmed or burned at the surface constitutes 8% of the 4.9 million barrels accounted for by the NIC, but that same volume is 10% of the 4.1 barrels that actually entered the water.



HOW MUCH OIL CAN BE COUNTED CONFIDENTLY AS RECOVERED FROM GULF WATERS?

The NIC report estimates that 392,000 barrels of oil have been either burned or skimmed from surface waters, which seemed to our group to be a reasonable approximation. However, to the best of our knowledge, these estimates are based on data that are not available to the general public or the scientific community and, therefore, are not independently verifiable. However, using this figure from the federal report, we calculated that 10% of the oil that actually spilled into Gulf of Mexico waters was removed at the surface through skimming and burning. Thus, 90% of the oil that entered the Gulf of Mexico has not been recovered.

WHAT HAS HAPPENED TO THE UNRECOVERED 90%?

The NIC report states that oil released into the water, that has not been contained by skimming or burning, is currently in one of four states:

- 1) dispersed as micro-droplets,
- 2) dispersed as micro-droplets with dispersant coating,
- 3) dissolved (some of which has evaporated) and
- 4) residual.

Together, these forms make up the unrecovered 90%. The news media’s tendency to interpret “dispersed” and “dissolved” as “gone” is wrong. Dispersed and dissolved forms can be highly toxic. Furthermore, sorting the oil into the four above states falls far short of assessing how much of it remains a potential threat to the system.

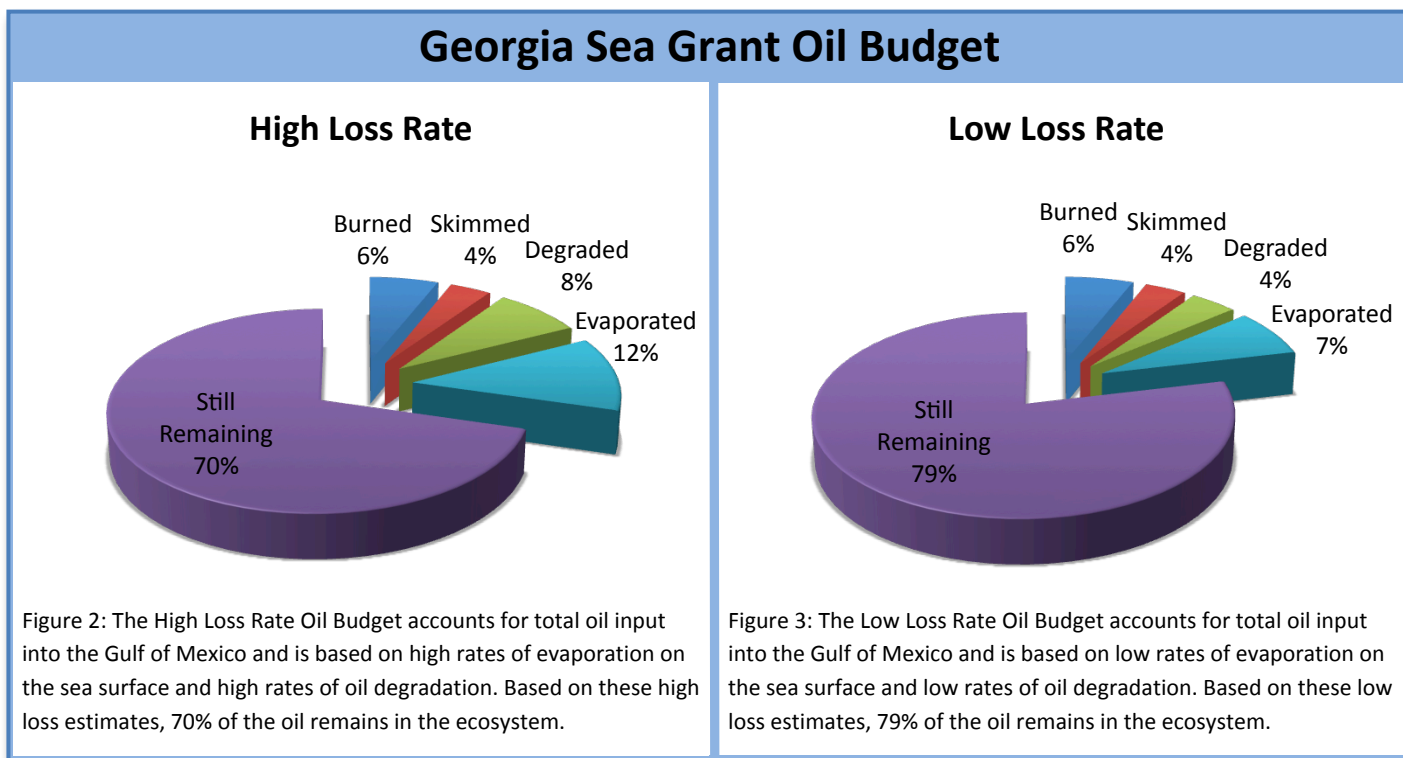
Fortunately, natural weathering processes ARE degrading and evaporating the various compounds that make up what we collectively call crude oil, and certainly a significant fraction of the unrecovered oil has been removed from the Gulf through evaporation or degraded into harmless forms. The following is this group’s attempt to estimate how much.

HOW MUCH OIL HAS BEEN COMPLETELY DEGRADED BY MARINE ORGANISMS?

There are no data available from the scientific literature or the National Incident Command on rates of decomposition or weathering of oil released from the BP spill. Because so much oil exists as micro-droplets in deep, very cold ocean waters, it is difficult to infer decomposition rates from studies of previous spills occurring closer to the surface. However, several scientific studies are currently underway to directly address this critical need.

We asked our scientific experts to estimate, as best they could, the percentage of subsurface oil that has degraded. They suggested a range of between 5% (see Figure 3) and 10% (see Figure 2). Given that estimate, we calculated that between 168,000 and 319,000 barrels have been removed from the Gulf through degradation. This is equivalent to 4-8% of the total oil released into the water.

However, it is important to realize that the degradation of crude oil by marine organisms mostly entails short-chain hydrocarbons—not the more toxic, polycyclic aromatic hydrocarbons (PAHs). Mass balance calculations, such as we are doing here, do not reflect this preferential decomposition. The most toxic components of crude oil are the least likely to be naturally degraded.



HOW MUCH OIL MAY HAVE EVAPORATED?

The NIC report estimates that 1.2 million barrels (30%) of oil released at the wellhead dissolved in the water and are, therefore, in a form that could evaporate. However, for oil to evaporate, it must come in contact with the atmosphere. Without knowing how much of the oil is at various depths, it is difficult to estimate how much oil could have reached the surface in order to evaporate. Our experts set the range of evaporation at 25% (see Figure 3) to 40% (see Figure 2). Based on this estimate, we calculated that between 306,000 and 490,000 barrels of oil have evaporated into the atmosphere and are no longer in the Gulf of Mexico. This amounts to 8-12% of the total oil spilled into the Gulf.

However, oil evaporated into the atmosphere can also have environmental and health-related effects. Questions have been raised by the state's scientific community about the vulnerability of communities living downwind of the Gulf of Mexico, including the Atlanta metropolitan area. An atmospheric sampling program designed to measure concentrations of oil components in the air would help determine how much has evaporated as well as track its dispersion and movement throughout the region and. This study is critically needed.

HOW MUCH OIL REMAINS?

There have been no oceanographic surveys measuring the entire breadth of the subsurface oil plume, only cruises targeting specific regions of interest to the scientific community. Thus, we can only estimate how much remains below the surface. However, after accounting for oil that has been skimmed and burned (10% collectively), evaporated (8-12%) and degraded (4-8%), we estimate that the oil remaining at or below the surface is between 70 and 79% or between 2.9 and 3.2 million barrels.

We note that this does not account for oil that we know has washed into coastal wetlands. This is a particularly difficult form to quantify, since much of it has settled in tidal creek and bay bottoms or has been buried in salt marsh and creek bottom sediments.

WHAT IS THE VULNERABILITY OF THE EAST COAST WATER?

The good news is that our vulnerability decreases day-by-day. Now that the BP leak has been capped, oil is no longer being added to the Gulf of Mexico, and the weathering of all forms of oil continues. As long as Eddy Franklin continues to block the Loop Current from sweeping oil-contaminated water from the spill region into the Gulf Stream, little oil should be transported to the East coast. With time, the oil will continue to weather and decrease in concentration and toxicity. However, without knowledge of the dispersion and mixing rates in the surface and bottom waters surrounding the spill region, the evaporation rates at the surface and the oil decomposition and weathering rates, it is impossible to estimate how long it will take for oil to disappear from the Gulf.

As we plan, seek funding for and implement sampling programs to track the form and concentration of oil in Georgia coastal waters, we need continual updates on the degradation and dilution of oil in the Gulf of Mexico, as well as real measurements of oil transport in the Loop Current and the Florida Current.

ABOUT THE GEORGIA SEA GRANT COLLEGE PROGRAM

The Georgia Sea Grant College Program, housed at the University of Georgia, has taken a leading role in working with state legislators toward the development of a monitoring system to

check for the presence of oil in Georgia's waters and coastal ecosystem. Georgia Sea Grant, in collaboration with other South Atlantic Sea Grant programs, has convened several summits to gather input from the region's top physical oceanographic, petrochemical and chemical oceanographic experts on how and in what form oil could be transported from the Gulf of Mexico to South Atlantic waters.

Georgia Sea Grant supports research, education and outreach activities that promote environmental and economic health and vitality in coastal Georgia by helping to improve public resource policy, encouraging far-sighted economic and fisheries decisions, anticipating vulnerabilities to change and educating citizens to be wise stewards of the coastal environment. For more information about the Georgia Sea Grant, contact Jill Gambill, Communications Director, at (706) 542-3463 or jgambill@uga.edu or visit www.marsci.uga.edu/gaseagrant.

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