

<sup>1</sup> During the post-Irene cleanup

the bed –this causes the river to become straight. River banks also start to erode, causing the channel to become straight, as opposed to meandering. These two effects in tandem cause the river flow rate to increase, and as a result the river becomes more powerful and creates further flooding problems downstream from where the actual gravel mining took place. While the immediate reaction to a flood may be to remove gravel in order to deepen the river, experts agree that such actions are not only temporary and perceived, but that it actually causes further risk of flooding.<sup>6</sup> Figure 1 copied from a report by the Vermont Agency of Natural Resources illustrates the damage caused to a river by this type of mining.



Figure 1: Channel Response to Stream Gravel Removal

Source: River Management Program, "Gravel Extraction and Striping Factsheet," Vermont Agency of Natural Resources, June 14, 2005, accessed February 2, 2012, p.2.

In addition to these environmental hazards, a number of ecological risks also come to light with the removal of riverbed gravel. This type of removal has been deemed by the National Marine Fisheries Service (NMFS) to result in the degradation of the riverbed fish habitats.<sup>7</sup> According to the National Oceanic and Atmospheric Administration (NOAA), the impacts caused by the extraction of gravel include,

- ...loss or degradation of spawning beds and juvenile rearing habitat; migration blockages; channel widening, shallowing and ponding; loss of hydrologic and channel stability; loss of pool/riffle structure; increased turbidity and sediment transport;

<sup>5</sup> Louis Porter, "Water Also Always Finds a Way," Burlington Free Press, September 25, 2011, accessed February 2, 2012, <http://www.burlingtonfreepress.com/article/20110925/GREEN01/110923018>

<sup>6</sup> Scottish Natural Heritage, "Gravel Working in the River Tay System: A Code of Good Practice," University of Stirling, 2005, accessed February 2, 2012, [http://ec.europa.eu/environment/life/project/Projects/index.cfm?fuseaction=home.showFile&rep=file&fil=CASS\\_Good\\_Practices.pdf](http://ec.europa.eu/environment/life/project/Projects/index.cfm?fuseaction=home.showFile&rep=file&fil=CASS_Good_Practices.pdf) pp. 1041.

<sup>7</sup> National Marine Fisheries Service, "NMFS National Gravel Extraction Policy," Southwest Regional Office: NOAA, accessed January 26, 2012, <http://swr.nmfs.noaa.gov/hcd/gravelsw/Section1>.

increased bank erosion and/or stream bed downcutting; and loss or degradation or

dwindling.<sup>17</sup> This policy establishes a set of loose and flexible recommendations designed to limit the amount of degradation associated with the practice of extracting gravel from rivers. Among the most pertinent recommendations are to limit gravel extraction to the bigger streams and rivers that are “braided” in nature over smaller systems. When managing gravel mining procedures, the focal point should be the protection of habitat. The impacts that the mining could have on anadromous fish populations should be analyzed by local, state, and federal stakeholders. Furthermore, restoration practices should be integrated into the overall management plan including the initiation of a program aimed at monitoring the environmental impacts throughout the project. Before the initial gravel extraction, experts should look for any potential contamination in the sediment. Lastly, when mining takes place in a floodplain, a buffer zone should be placed between the river and the floodplain.<sup>18</sup>

The NMFS also recommends that an assessment of the starting levels of environmental health should be evaluated and documented before extraction of the gravel begins. After doing this, it is recommended to maintain documentation of the health of the environment throughout the process of extraction. Finally, when the extraction of gravel is complete, the NMFS highlights the importance of formulating “a long-term monitoring and restoration program.”<sup>19</sup> Because of the environmental and ecological risks associated with the type of sediment removal, many states have also taken initiatives to curb or regulate its use, outlined below.

In the state of Washington, a study on the effects of gravel extraction from rivers took place focusing on the South Fork Snoqualmie River. As a result of this plan, the King County Flood Hazard Management Plan was established to deal with the issues deemed to be associated with gravel extraction in this region.<sup>20</sup> According to this management plan, it is only acceptable to extract gravel from streams and rivers to manage potential floods if there is evidence that the accumulation of gravel presents an actual increase in the risk of potential flooding. In the endeavor must also be associated with an overarching management plan for flood prevention, maintaining the same data as current experts.<sup>21</sup>





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