Dear Viewer,

Thank you very much for your comments. We have carefully considered your suggestions and revised the manuscript accordingly. The comments and detailed responses can be summarized as follows:

1. How to define a watershed "large scale" or not?

Responds: In fact, there is no exact threshold value to divide a watershed into different scale. In general, it is thought that a watershed that is smaller than 100 km^2 can be defined as small-scale watershed, while a watershed larger than 1000 km^2 can be defined as large-scale watershed. In larger watershed, the relatively small number of water quality monitoring stations may provide a false result indicating homogeneous distribution of non-point-source priority management areas due to the dampening effect of the traditional approaches. A well designed station network, in terms of multiple assessment points, is necessary to hinder the averaging of spatial heterogeneity in large-scale watershed. Instead, the relatively heterogeneity at small scale watershed can be obtained by those traditional approaches. It is concluded that consideration of multiple assessment points is very important in studying the spatial variability of non-point-source priority management areas, particularly in larger watersheds.

2. If the pollutant is controlled at the upstream, the self-purification capacity of the downstream river is not fully used. By considering this view, how do the authors explain the advantages and disadvantages of MAP-PMA?

Responds: We agree with your idea that "If the pollutant is controlled at the upstream, the self-purification capacity of the downstream river is not fully used." However, from a water quality perspective, the scientific basis of MAP-PMA is based on the idea that the water quality at multiple assessment points should reach the required level. In this sense, the main advantage of MAP-PMA framework is integrating the upstream input changes and the downstream transport aspects of NPS pollution. This is especially important, especially for the downstream sub-watersheds. Based on our results, there was great variation between the MAP-PMAs and traditional PMAs

among the downstream areas. This can be explained by the fact that the MAP-PMA focused on the pollutant load actually reaching those multiple assessment points. The disadvantage of MAP-PMA is that the self-purification capacity of the downstream river is not fully used, but this is a more cost-effective way from the perspective of the whole watershed.

3. For the traditional researchs of NPS pollution, priority sources areas (PSAs) identification is often documented. How do the authors compare which is more useful in real practices, MPAs or PSAs?

Responds: Indeed, either priority sources areas (PSAs) or priority management areas (PMAs) are widely accepted concepts, which are defined as those areas where the risk potential of certain pollutants exceeds local loss tolerance or contributes more pollutant to the nearby water body. Comparatively, PSAs are often referred to those high-pollutant-loss areas that are of small scale or within a specific district. This idea is derived from the land resource perspective, which brings local collaborators into the cost share programs. PMAs are often referred to the impact of BMPs on the nearby water quality. As mentioned in the paper, we had taken pollution sources into account, as well as made the corresponding processing: each required load reduction is separated into its origin sources to reach a specific frequency of water quality target at multiple assessment points. In MAP-PMA framework, the sensitive areas where responsible for disproportionate load contributions to the pollutant fluxes are identified at multiple river assessment points. Based on the identification results, management practices can be positioned accurately. In this sense, “PMAs” looks more suitable than “PSAs”.

4. The example of Daning River Watershed should be mentioned in the abstract. Also there are some technical corrections.

Responds: The example of Daning River Watershed have been mentioned in the abstract. Other technical errors have been revised accordingly. Please check the new manuscript.