Willamette Basin

2023 Year Five Review

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State of Oregon
Department of Environmental Quality

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Executive summary

The 2023 Willamette Basin Total Maximum Daily Load Year Five Review is the third comprehensive assessment of TMDL implementation activities that many designated management agencies in the Willamette Basin are using. The Designated Management Agencies represented in this report include cities, counties, and special districts implementing TMDL water quality improvement plans in the Willamette Basin. This report does not include results from the Molalla-Pudding Year Five Review, which is administered on a different five-year cycle.

DEQ administers the review every five years to support assessment of TMDL implementation activities. DMAs must report on activities that occurred or are planned to occur within their most recent five-year period of TMDL implementation. This report relies on survey responses from 60 DMAs. Surveys were collected between Aug. 31, 2023, and Dec. 31, 2024. DEQ will begin to administer the next review in 2028.

The survey that DMAs completed focused on pollutant reduction strategies and practices for bacteria, mercury and temperature. These TMDL pollutants are typically addressed through stormwater management and riparian protection and enhancement programs. The 2023 survey results indicate that the number of DMAs implementing a diverse suite of pollutant reduction strategies and practices is growing when compared to previous years' survey results. However, DMAs that have permitted municipal separate storm sewer systems, and DMAs with relatively larger populations, continue to be more likely to implement any selected strategy or practice compared to non-permitted MS4 or smaller DMAs. While non-permitted MS4 and smaller DMAs continue to be less likely to implement any particular strategy or practice, survey results show that these DMAs are adopting and implementing additional policies and actions over time. Moving forward, DEQ expects the implementation gaps between MS4 permitted and non-permitted DMAs, and larger and smaller DMAs, to decrease as DMAs meet deadlines to fully implement the requirements of the 2019 Willamette Basin Mercury TMDL and the 2025 Willamette Subbasins Temperature TMDL.

Limitations of this report include: DEQ staff did not verify each DMA response to the survey, so results are only based on DMA-provided information; survey results represent about

66 percent of DMAs that had TMDL implementation and reporting responsibilities between 2018 and 2023, so this information does not cover all the progress that DMAs have made regarding TMDL implementation in the Willamette Basin.

Contents

TMDL background

Under the Federal Clean Water Act, a delegated authority must develop water pollution control plans to restore and maintain the chemical, physical and biological integrity of the state's waters. In Oregon, DEQ is the delegated authority responsible for developing these plans. Water pollution control plans are known as Total Maximum Daily Loads (TMDL) and are issued by DEQ as a department order or rule (OAR 340-42-0040). A TMDL is the maximum amount of a pollutant a waterbody can receive and still meet state water quality standards. Information about current applicable water quality standards and beneficial uses of Oregon's waters can be accessed from DEQ's Water Quality Standards webpage (see links provided in References).

There are different TMDLs that apply to rivers and streams within the Willamette Basin and its subbasins. Pollutants addressed by these TMDLs include bacteria, mercury, temperature, toxics, dissolved oxygen, pH and nutrients. Complete documentation of TMDLs approved for the Willamette Basin and its subbasins can be accessed from DEQ's Willamette Basin TMDL webpage. Information about TMDLs that are under development can also be accessed from DEQ's TMDL webpage (see links provided in References).

A TMDL Water Quality Management Plan (WQMP) is one of the required elements of a TMDL (OAR 340-42-040). It provides an implementation framework for the management strategies that will help attain and maintain water quality standards. A WQMP includes the names of responsible persons and Designated Management Agencies that must develop and implement plans that identify specific management strategies and practices that are expected to reduce pollutant loading to help meet TMDL load allocations. DMA implementation plans must also include a timeline for strategy implementation and a schedule for completing measurable milestones; performance monitoring and a plan for periodic review and revision of implementation plans; and any other analyses or information specified in the WQMP (OAR 340-042-0080).

Most of the entities named as responsible persons and DMAs in the Willamette Basin TMDLs must submit annual progress reports on their implementation activities. They must also submit a more comprehensive assessment of their implementation efforts every five years. This assessment includes an updated implementation plan that outlines the next five years of their implementation activities.

This report provides a comprehensive summary of how a majority of Willamette Basin (Fig. 1) DMAs are addressing pollutant loading through stormwater and riparian management activities. This report is based on survey responses from 60 DMAs. Surveys were conducted between Aug. 31, 2023, and Dec. 31, 2024. These DMAs represent cities, counties, and special districts, that are responsible for managing stormwater runoff and riparian areas. This report also includes comparisons from survey results collected in 2018 and 2013.

Figure 1. The subbasins (8-digit HUCS) that comprise the Willamette Basin.

Stormwater management

There are six stormwater control measures identified in Willamette Basin TMDLs that DMAs must implement. These control measures are effective at removing sediment in stormwater runoff, and they are likely to remove pollutants that reside in sediment, e.g., mercury, bacteria, legacy pesticides, PCBs, dioxins, iron, and turbidity. This section summarizes the responses from DMAs about the following stormwater measures: Pollution Prevention in Municipal Operations, Public Outreach and Education and Public Participation, Illicit Discharge Detection and Elimination, Construction Stormwater Erosion Control, and Post Construction Stormwater Control.

Some of the DMAs in the Willamette Basin have a National Discharge Pollutant Elimination Systems (NPDES) permit from DEQ for their stormwater discharges. Municipalities that have a municipal separate storm sewer system (MS4), and meet specific population and urbanized area criteria, are required to obtain an NPDES MS4 permit. An MS4 permit includes a requirement to develop a storm water management plan. Phase I MS4s are those permittees with populations greater than 100,000 or permittees that meet urban area criteria. Phase II MS4s serve populations typically less than 100,000 that are located within U.S. Census Bureau-defined urbanized areas. All DMAs must utilize stormwater control measures to address TMDLs regardless of population size or MS4 permit coverage status. Table 1 summarizes the population size and MS4 permit status of the DMAs that completed the 2023 survey.

Table 1. Number of DMAs that completed a Year Five Review survey for this report. DMAs are grouped by population size and MS4 permit status. There is a total of 60 DMAs.

MS4 Permit Status	Population under 1,000	Population 1,000-4,999	Population 5,000-9,999	Population 10,000 or greater
MS4 Phase I	1	0	0	14
MS4 Phase II	0	2	0	9
Non-permitted MS4	7	12	6	9
Total	8	14	6	32

Pollution Prevention and Good Housekeeping in Municipal Operations

Pollution Prevention and Good Housekeeping in Municipal Operations is a control measure for stormwater that requires DMAs to identify impacts to stormwater runoff from their operation and maintenance activities. This helps prevent pollution before it happens. The survey included a list of 20 strategies and practices, which are common elements of Pollution Prevention and Good Housekeeping programs.

DMAs that are MS4 permittees consistently show higher implementation rates for strategies and practices included in the survey compared to DMAs without an MS4 permit. MS4 permittees are also more likely to report implementing 10 or more of these strategies and practices (Fig. 2). A low response rate for any specific Pollution Prevention and Good Housekeeping practice does not necessarily represent a gap in implementation for a particular DMA, especially if a practice does not apply to the system being managed.

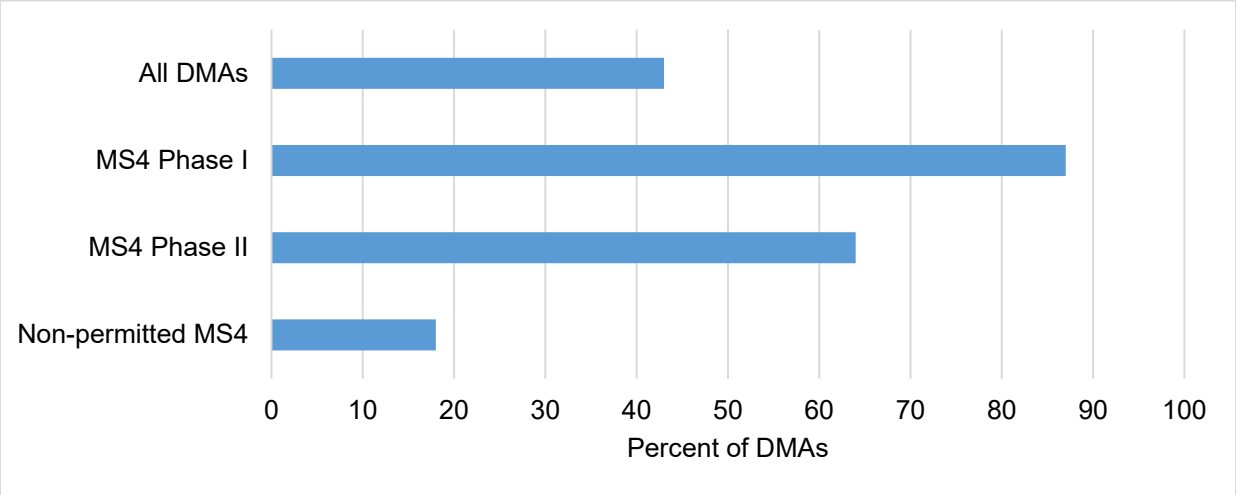

Figure 2. The percent of all DMAs, and DMAs categorized by MS4 permit status, that are implementing 10 or more of the 20 common pollution prevention strategies and practices included in the 2023 DEQ survey.

There are certain strategies that are foundational to successful implementation of a Pollution Prevention and Good Housekeeping program. For example, establishing fees specifically for stormwater management is an important step in securing funds to support short-term and long-term goals for stormwater system maintenance and development. Over a 10 year period, there was a noticeable increase in the percentage of DMAs that reported having a specific fee mechanism for stormwater management (Fig. 3). DEQ expects the number of DMAs that have a stormwater fee to continue to increase as stormwater programs continue to mature.

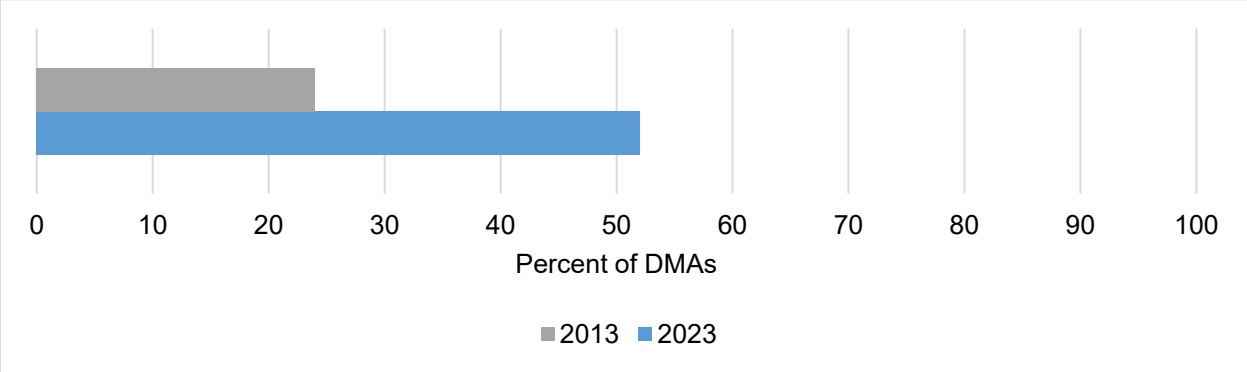

Figure 3. Percent of all DMAs that reported having a stormwater development or service fee in survey years 2013 and 2023.

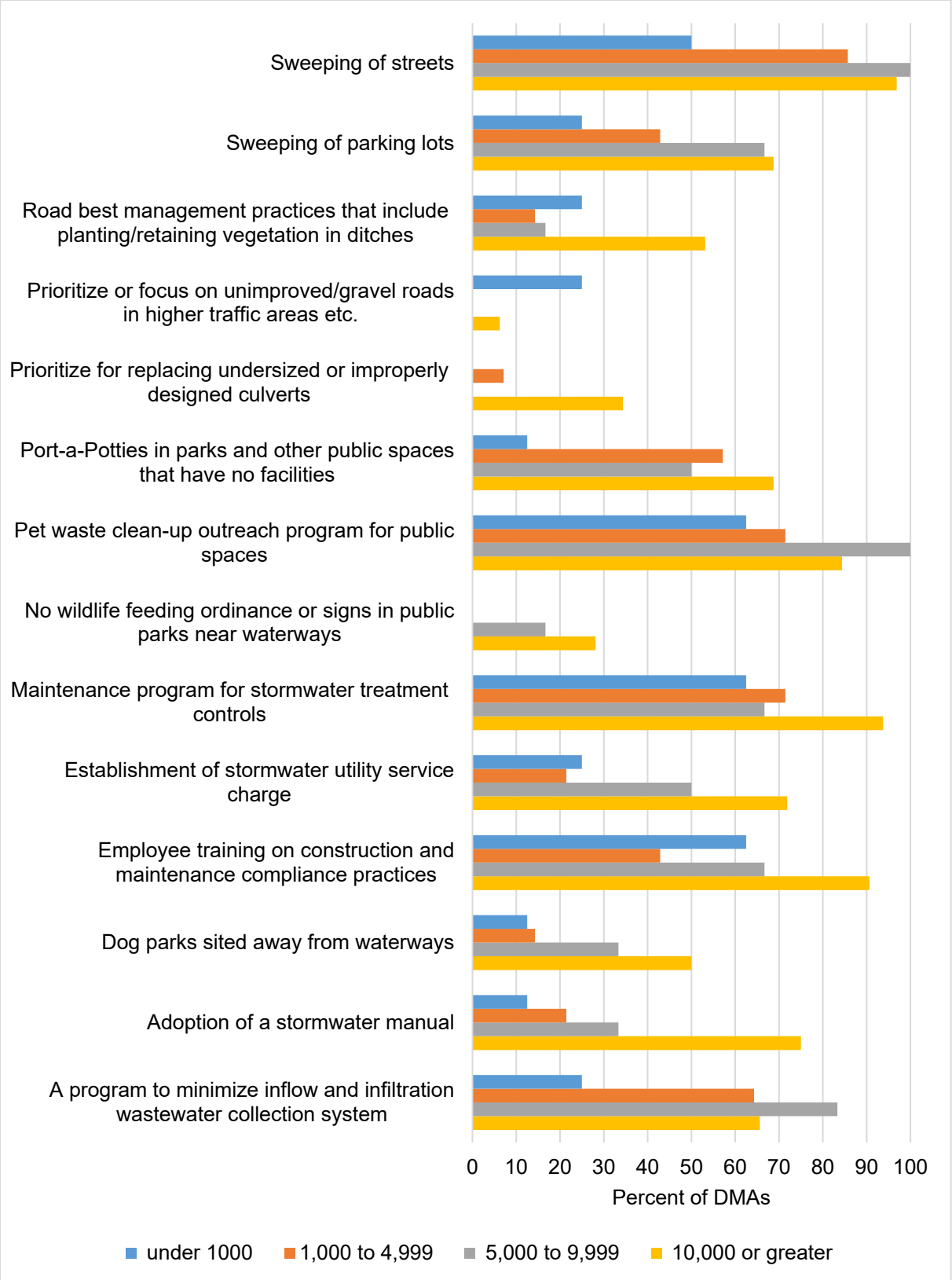

Figure 4. Percent of DMAs by population size implementing common Pollution Control and Good Housekeeping strategies or practices, 2023.

Public education and outreach, and public participation

Public Education and Outreach, along with Public Participation, are control measures that require DMAs to implement educational programs that inform the public about stormwater and water quality issues, while also encouraging public involvement in decision-making and pollution prevention efforts. There are a variety of strategies and practices that can address these objectives. This provides an opportunity for DMAs to be creative in how they design and implement their education, outreach, and participation program.

Overall, results show DMAs are using many different outreach, education, and participation strategies and practices. One of the most common outreach techniques is utilizing websites for public education and engagement (Figure 5). DMAs that have a population of 5,000 or more tend to implement any specific strategy or practice at higher rates compared to DMAs with smaller populations. Riparian protection incentives were only reported by DMAs with a population of 10,000 or greater. These DMAs were also far more likely to report participating in a regional outreach campaign. Mid-sized DMAs showed strength with community focused events, and small DMAs (populations under 5,000) preferred completing local activities such as clean-up events, tree programs and city council involvement.

Overall, MS4 Phase I DMAs reported higher implementation rates for most activities compared to MS4 Phase II DMAs and nonpermitted DMAs (Fig. 6). Notably, relatively more Phase I DMAs reported having region wide partnerships and initiatives compared to other DMAs. Some strategies and practices were less commonly reported, and some have even become less common over time. Very few MS4 permittees reported implementing riparian protection incentives, and incentives were not reported at all by nonpermitted DMAs (Figure 6). Since 2013, fewer DMAs reported the use of public workshops, and posting riparian information on a stormwater or water quality webpage (Fig. 7).

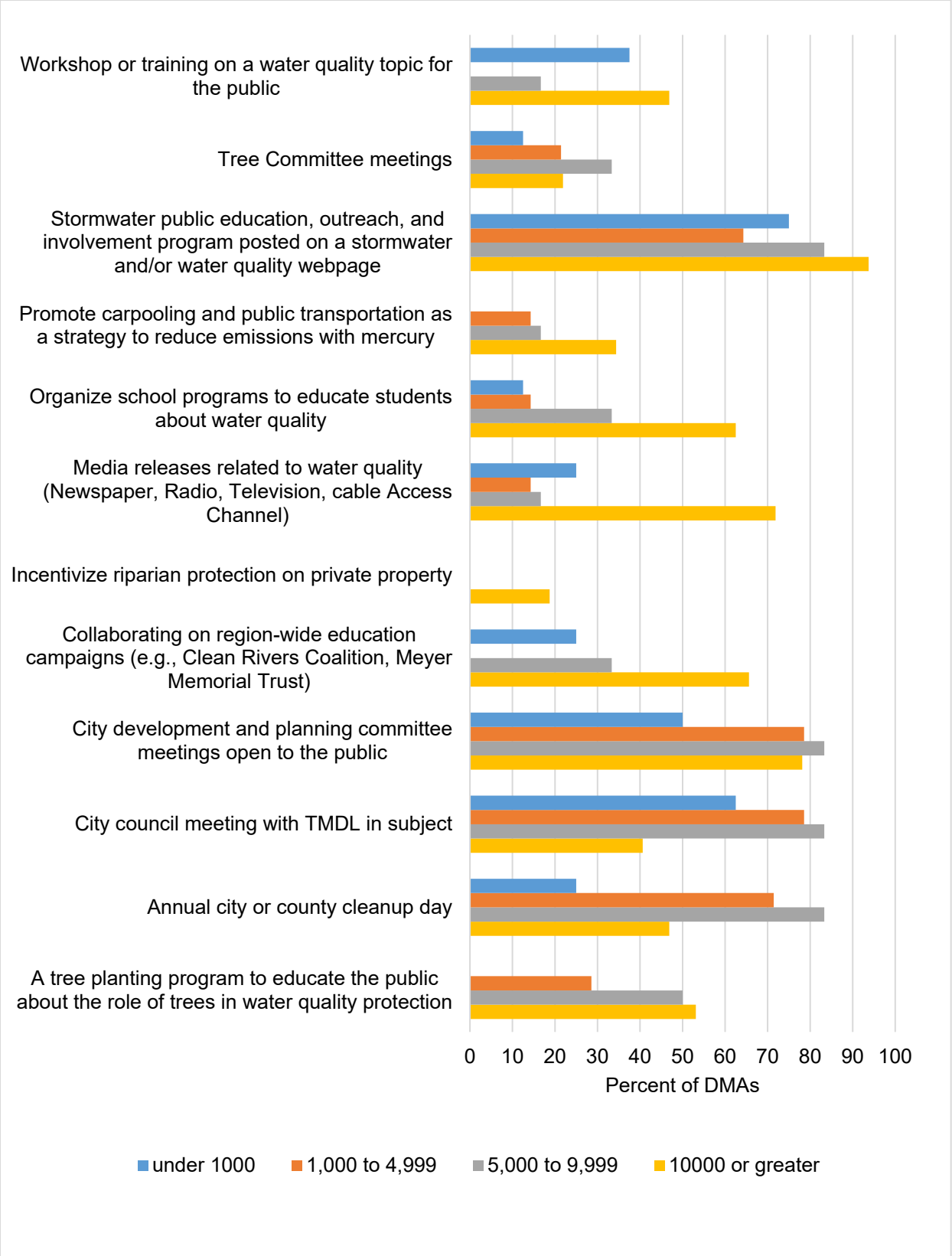

Figure 5. Percent of DMAs by population size implementing a Public Education and Outreach or Public Involvement strategy or practice, 2023.

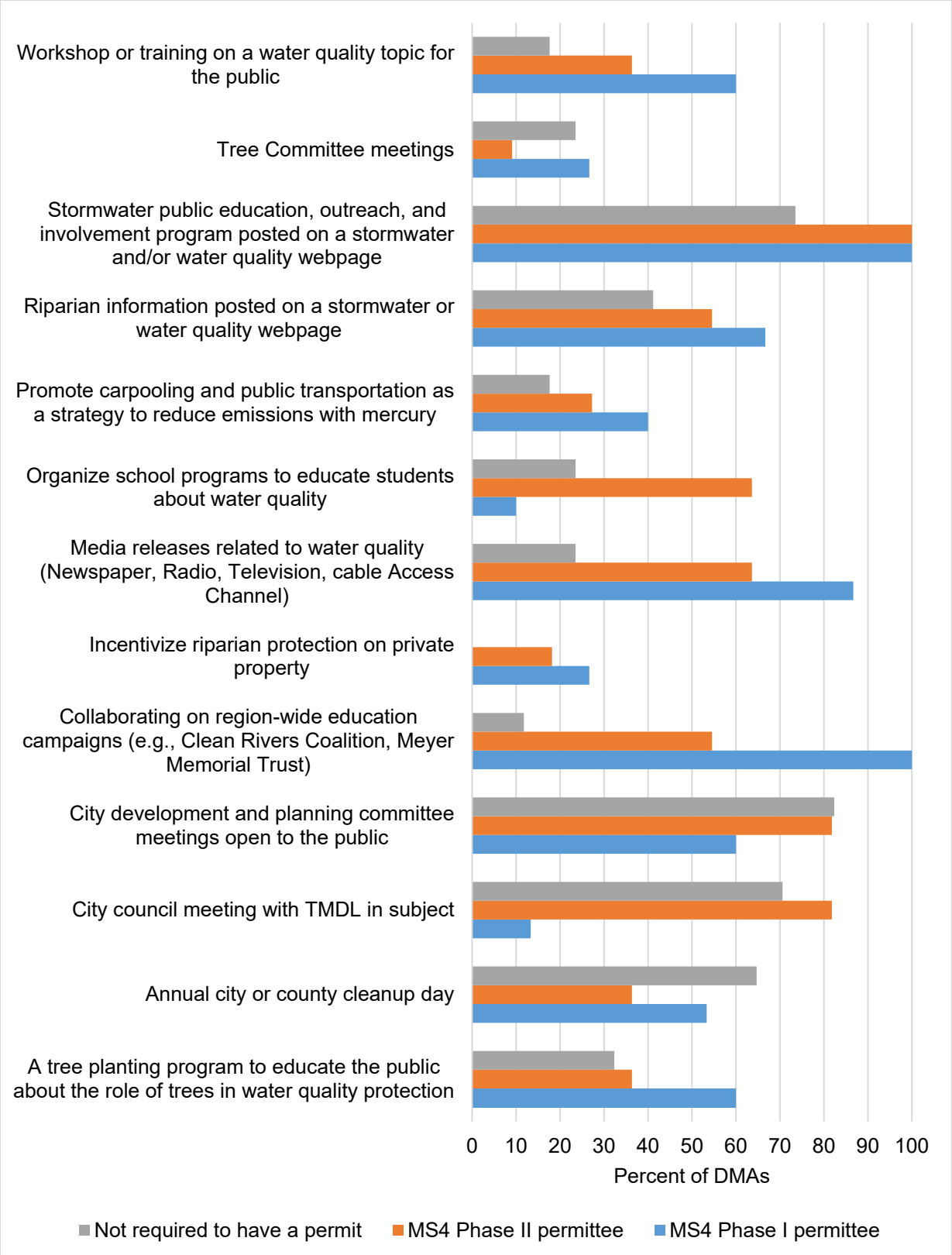

Figure 6. Percent of DMAs implementing public education and outreach strategies by MS4 Status, 2023.

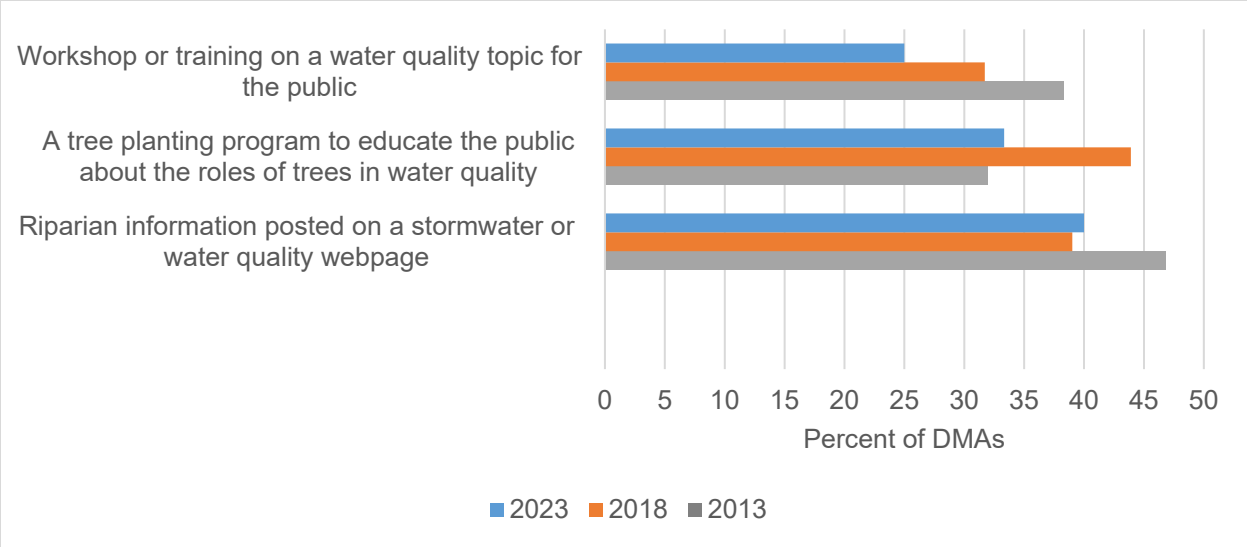

Figure 7. Percent of DMAs implementing selected practices in survey years 2013 and 2023.

Illicit discharge detection and elimination

Illicit discharges include any discharges into a municipal separate storm system (MS4) that do not consist entirely of stormwater. Common illicit discharges include pollutants such as oil, chemicals, sewage or industrial waste. Illicit discharge detection and elimination (IDDE) programs are an important control measure to reduce non-stormwater discharges to a stormwater system. There are several core components of an IDDE program including but not limited to mapping stormwater infrastructure, developing ordinances to prohibit illicit discharges, inspection and enforcement programs, detection programs, and education programs.

Year five survey results from 2018 and 2023 show that DMAs have reported increased implementation of some IDDE measures, however there are practices that were reported at lower rates. For example, DMAs reported an increase in formalizing a tracking system for illicit discharges, as well as a slight increase in developing procedures for responding to, and enforcing regulations for, illicit discharges. DMAs reported a noticeable decrease in using specific techniques such as smoke/ dye tracers or closed-circuit TV to conduct on-site investigations of illicit discharges (Fig. 8). These results may indicate DMAs placed greater emphasis on policy and enforcement over the last five years, or that other techniques and technologies are being employed for on-site investigations.

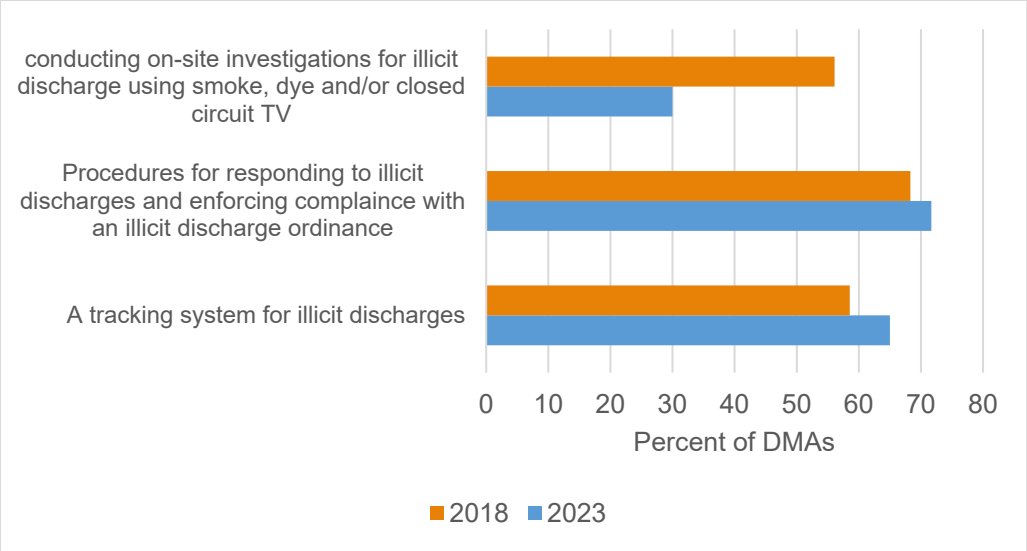

Figure 8. Selected strategies and practices in survey years 2018 and 2023.

Similar to other stormwater measures, population size may drive some of the implementation approaches for DMAs. Mid-sized and larger DMAs are more likely to maintain detailed stormwater system maps, while smaller DMAs demonstrate strengths in community-based and preventative strategies, such as outreach initiatives and local partnerships. Importantly, most DMAs regardless of size, are implementing a formal investigation and compliance program related to illicit discharges (Fig. 9).

While MS4 Phase I DMAs generally reported higher rates of implementation compared to MS4 Phase II DMAs and non-permitted DMAs for many measures, data show that DMAs from all MS4 permit categories are implementing most of the IDDE measures included in the 2023 survey. While non-permitted DMAs report consistently lower rates of implementation for many practices, more than half reported having core elements of an IDDE program, for example adopting code to prohibit non-stormwater discharges, and establishing procedures for responding to illicit discharges (Fig. 10).

Overall, results show MS4 Phase II and non-permitted DMAs implement many of the same IDDE practices, though often at reduced levels. Importantly, smaller and non-permitted communities, despite having fewer resources, are maintaining IDDE programs that include illicit discharge response and tracking, enforcement authority, and outreach efforts.

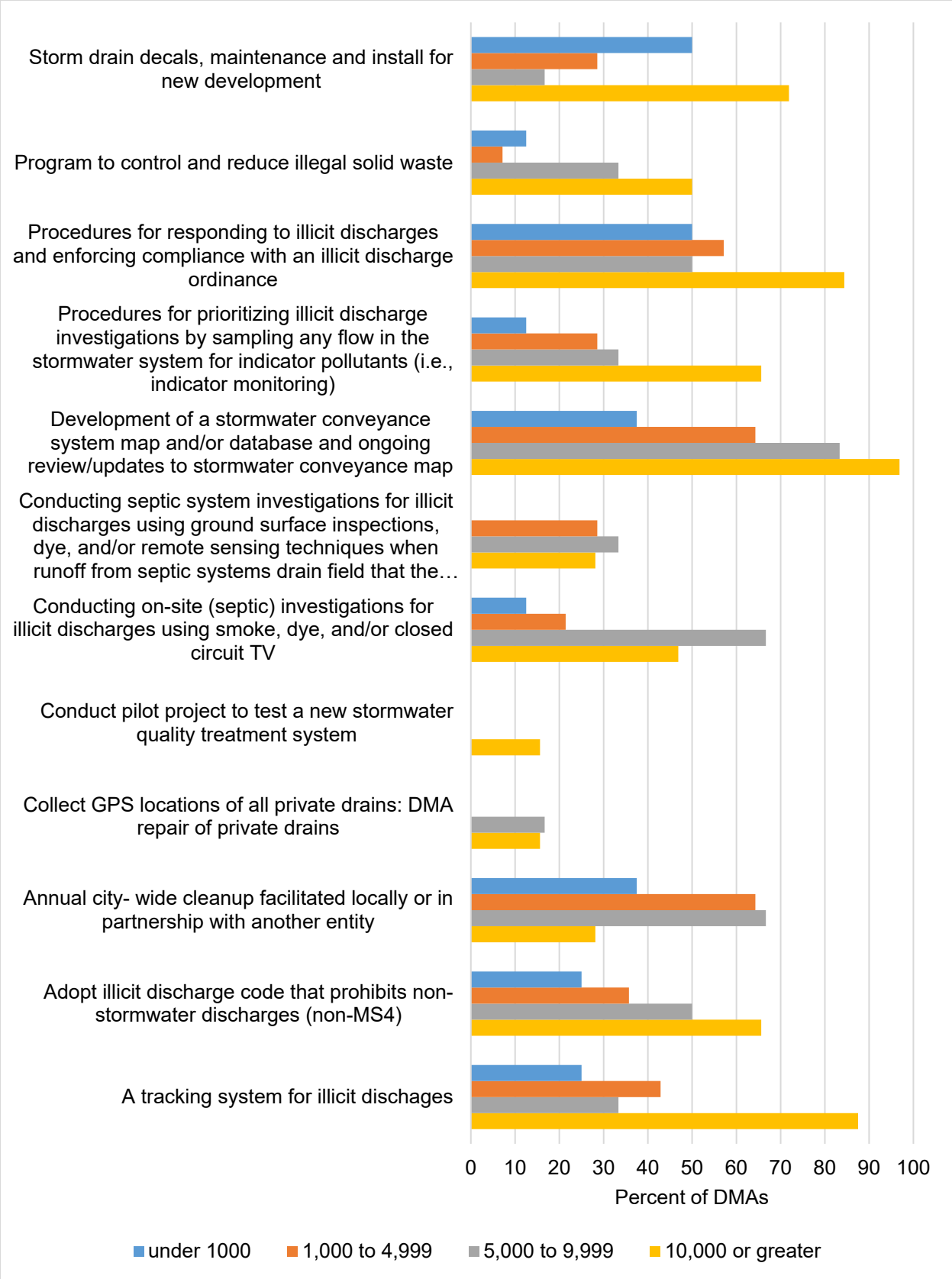

Figure 9. Percent of DMAs implementing IDDE practices by population size, 2023

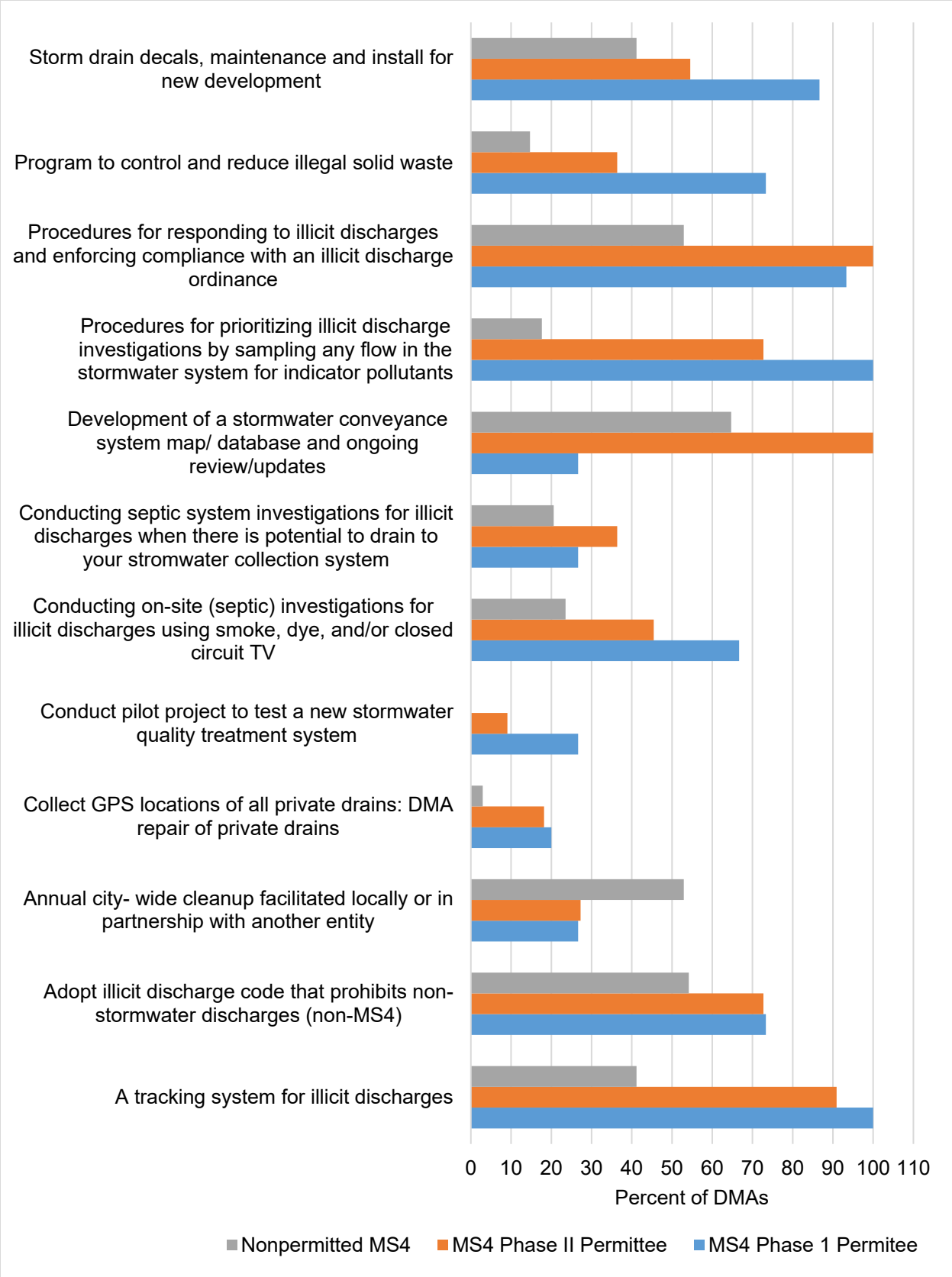

Figure 10. Percent of DMAs implementing IDDE practices by MS4 Status, 2023.

Construction stormwater runoff

Construction Site Stormwater Runoff Control programs are intended to reduce discharges of pollutants from construction sites within jurisdictional boundaries. Key strategies include regulatory mechanisms to require and enforce erosion and sediment controls during construction work, requirements for site operators to create and implement site-specific erosion and sediment control plans, review of erosion and sediment control plans, and inspections of erosion control best management practices at construction sites.

Construction site runoff control measures vary by DMA size, which follows patterns seen in other control measures, i.e., larger DMAs are more likely to implement any one specific strategy or BMP. For example, larger DMAs with are more likely to complete review of erosion and sediment control plans, conduct site inspections, and have systems in place to track inspections and use enforcement authority for violations (Fig. 11). While smaller DMAs are less likely to implement some construction stormwater measures, many of them are implementing important strategies that help reduce the impacts of stormwater. For example, smaller DMAs (population less than 10,000) are incorporating a determination for whether a 1200-C permit is needed or has been obtained as part of their planning and building permit process (Fig.11). This is a key strategy in implementing oversight of large (one acre or more) development sites; however, it does not address impacts from smaller development sites which need to be addressed at the local level.

Overall, survey results show that the response rate increased between 2018 and 2023 for many of the construction stormwater strategies and practices (Fig. 12). The measure to make a determination on whether a construction site requires a 1200-C permit had the largest response rate increase between survey years. Importantly, survey responses showed an increase in the percent of DMAs that are supporting on-the-ground inspections of constructions sites, e.g. having a system to track construction site inspections and follow up actions and conducting inspections to identify illicit discharges from construction sites.

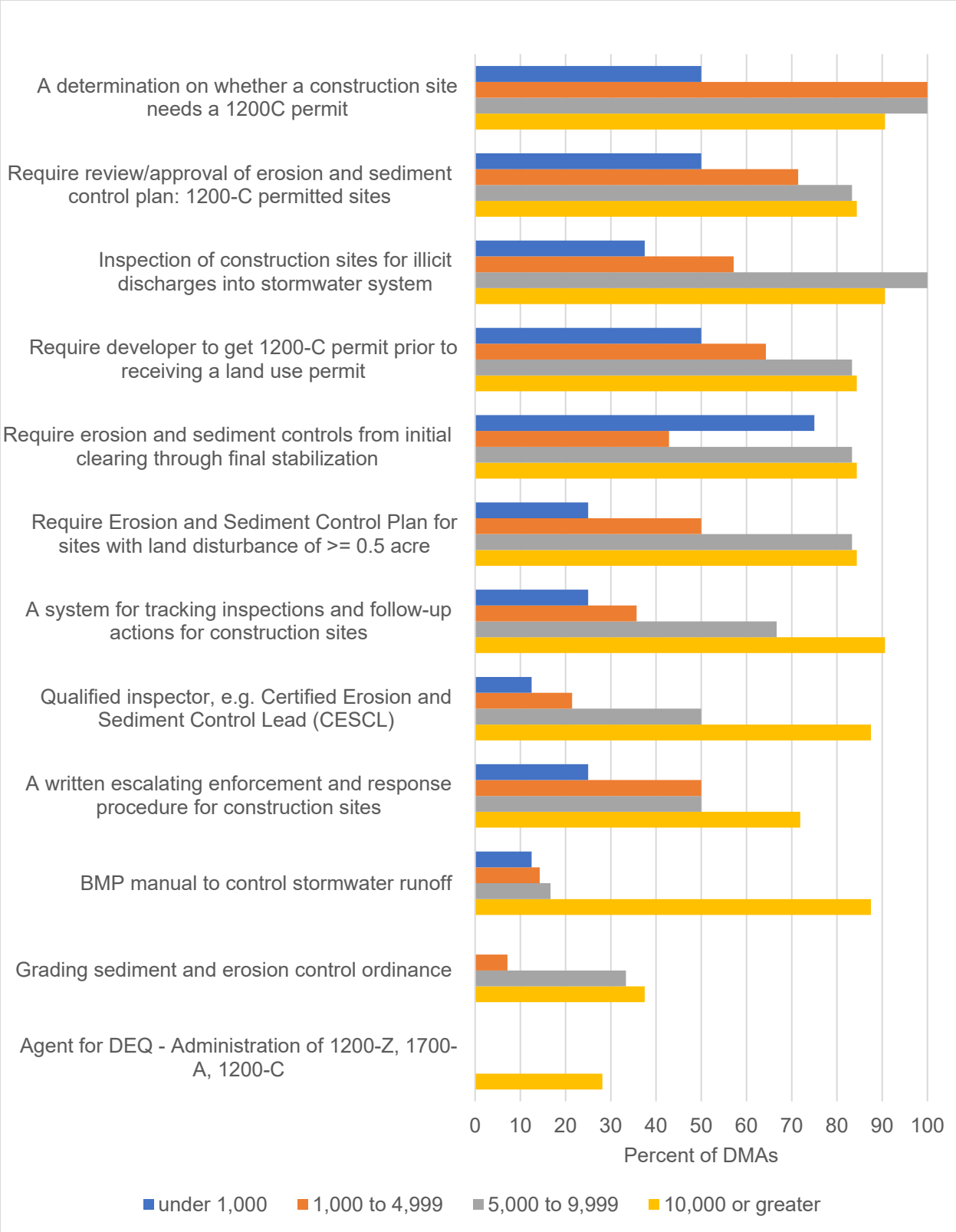

Figure 11. Percent of DMAs by population size implementing construction site erosion control measures, 2023

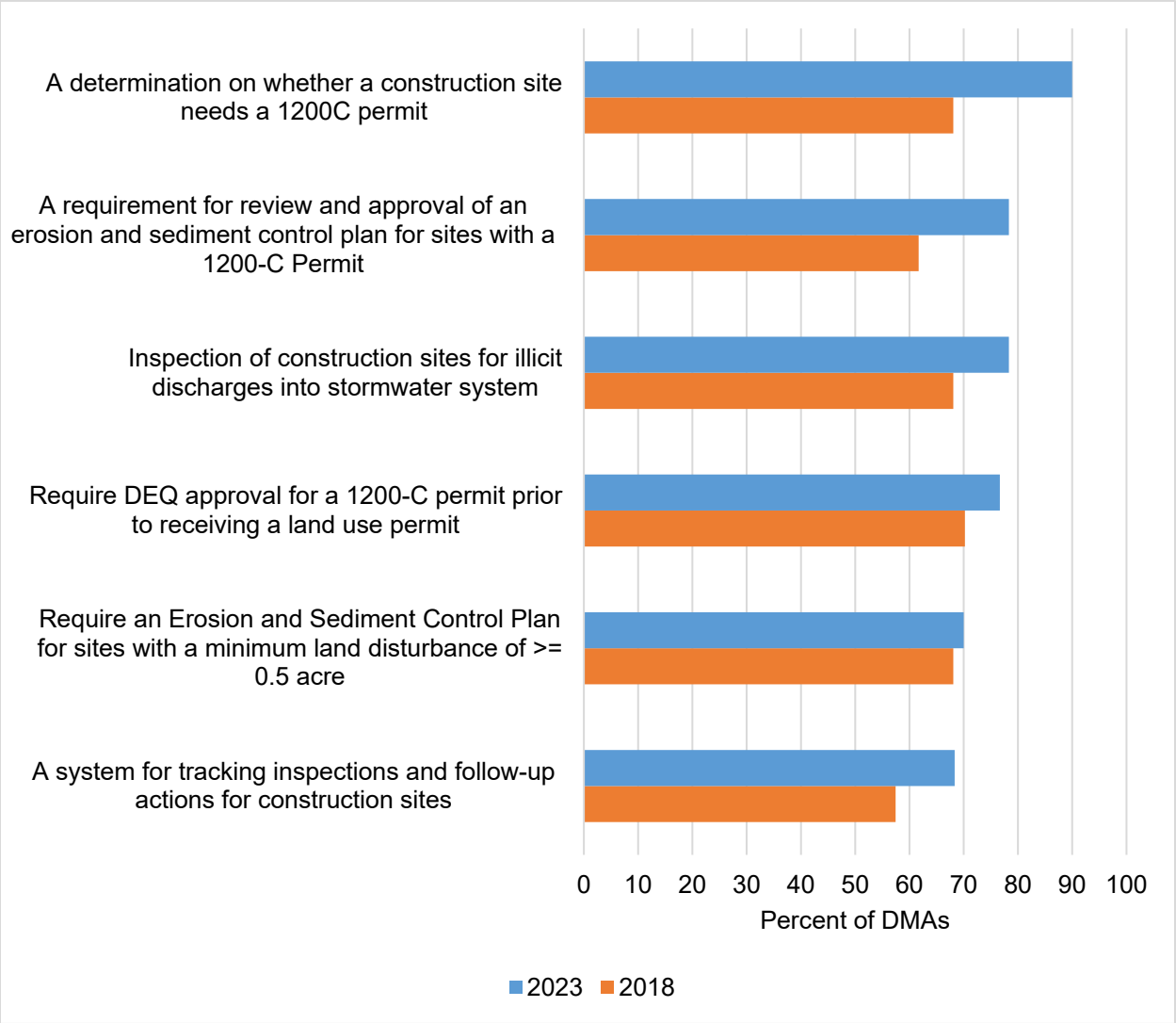

Figure 12. Comparison of the total percent of DMAs implementing selected construction stormwater and erosion control measures in survey years 2018 and 2023.

Post-construction stormwater runoff

Post-Construction Stormwater Runoff for New and Redevelopment programs are important for controlling and reducing stormwater discharges from impervious surfaces such as roads, sidewalks, parking lots, and roof tops. Program components may include ordinances or other regulatory mechanisms to require stormwater controls and maintenance for sites that create or replace impervious surface area above a size-threshold. Programs may also update regulatory mechanisms to remove barriers that inhibit the design and implementation of strategies and practices to address stormwater runoff. These programs also often have stormwater management requirements that include technical standards related to stormwater retention and treatment requirements.

As seen in 2018, the 2023 Survey results indicated that DMAs continued to implement fewer post-construction stormwater control strategies and practices compared to the other five stormwater measures. DEQ expects to see this trend change as deadlines approach for implementation of selected post-construction stormwater strategies and practices (see Willamette Basin Revised Mercury TMDL WQMP, 2019). Although post-construction stormwater programs are relatively less developed than other control measures, more DMAs reported implementing post-construction strategies and practices in 2023 compared to 2018 (Fig. 13).

Similar to other control measures, the smaller the population size of a DMA the less likely they were to report implementing a specific strategy or practice. Regardless of population size, relatively few DMAs reported completing code reviews to identify barriers to implementing post-construction stormwater controls, required off-site mitigation for stormwater that could not be fully retained on-site, or have an intergovernmental agreement related to stormwater (Fig. 14)

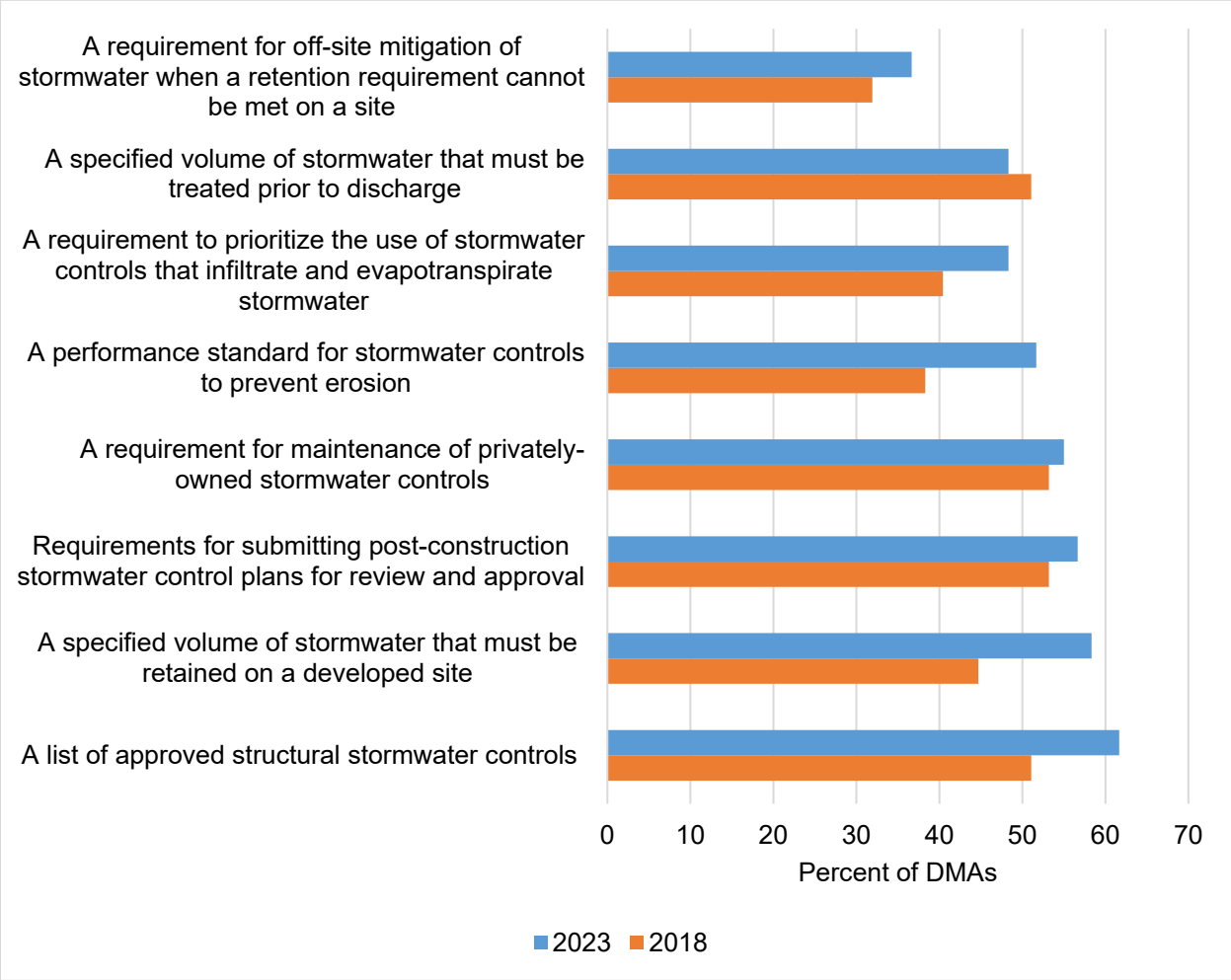

Figure 13. Comparison of the total percent of DMAs implementing selected post construction stormwater runoff control measures in 2018 versus 2023.

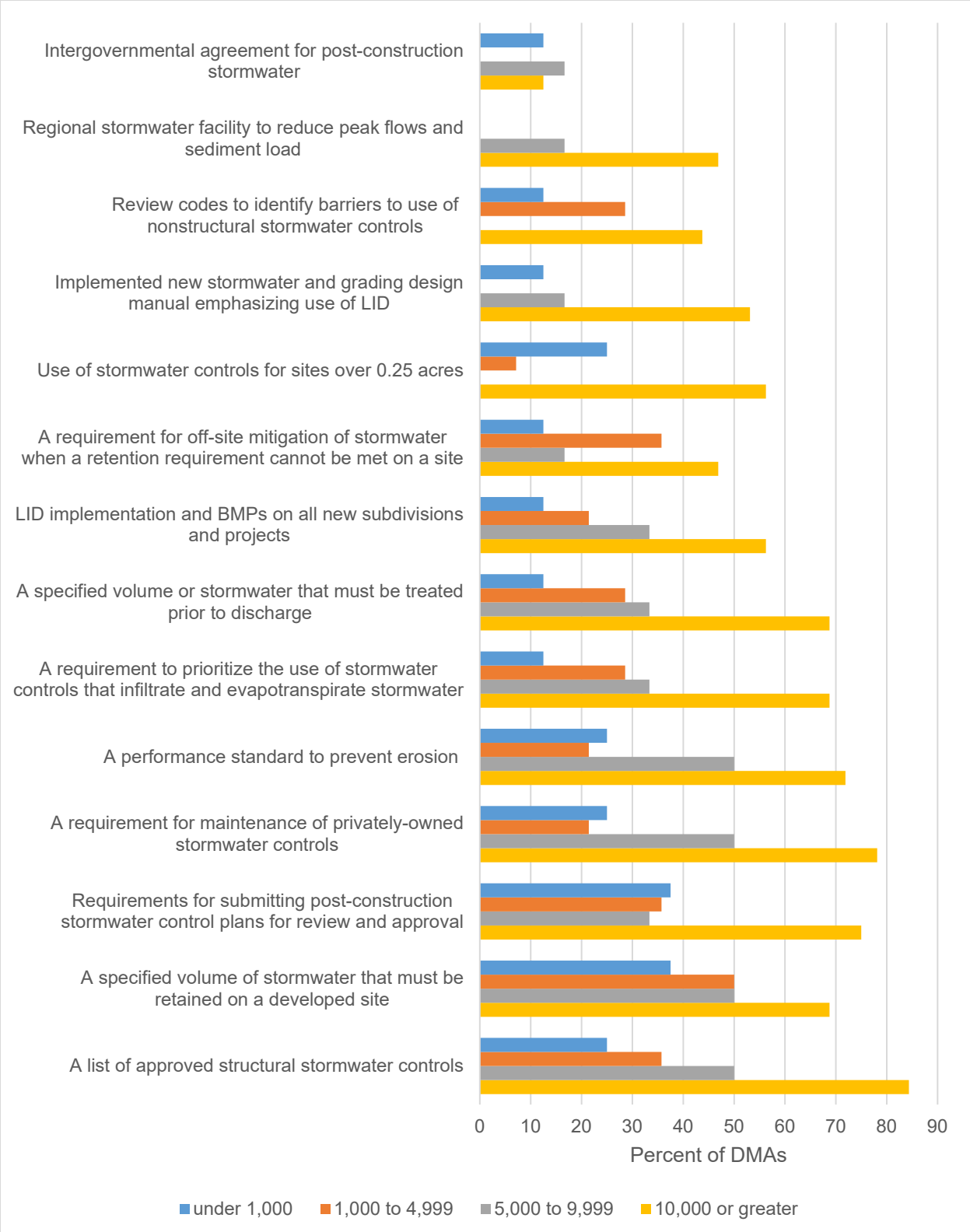

Figure 14. Percent of DMAs by population size implementing post construction stormwater runoff control measures in 2023.

Riparian protection and restoration

Protecting and restoring riparian areas are key strategies for maintaining and improving water quality. These efforts provide multiple benefits by addressing pollutants such as temperature through shading of waterbodies or filtering pollutants, such as bacteria and sediment before discharging to a stream. The wetland, water quality, and riparian strategies implemented by DMAs have varied in their approaches, but the most common measures include adopting riparian and wetland ordinances, codes, and rules to protect vegetation, as well as forming partnerships with local entities such as watershed councils. Looking ahead, the temperature replacement TMDL will continue to emphasize riparian-based strategies. As part of this effort, DMAs will complete a streamside assessment to document and evaluate existing riparian conditions.

For DMAs seeking restoration project ideas, the Oregon Watershed Enhancement Board (OWEB) tracks and maintains a database of watershed restoration projects. These projects can be viewed using OWEB's Oregon Watershed Restoration Tool.

Overview of riparian management strategies

For 2023, DMAs implemented a wide range of riparian and water quality protection strategies. These efforts reflect a combination of restoration projects, policy measures, and land protection initiatives aimed at improving watershed health and maintaining compliance with water quality goals. The following summary highlights key activities reported by DMAs, including restoration projects on public and private lands, land acquisition and protection efforts, regulatory tools, mitigation and source water protection programs.

- DMAs reported 373 riparian restoration projects implemented or funded on private land during the reporting period
- DMAs reported 592 riparian restoration projects implemented or funded on public land during the reporting period
- 24 DMAs reported some amount of land acquisition or protection along the riparian corridor. Results were reported in varying units and encompassed different types of activities. These included land purchases of less than one acre to hundreds of acres, replanting efforts, and support of other entities implementing riparian protection strategies
- 52 DMAs (87percent of respondents) report that their jurisdiction has development codes in place to reduce the loss of wetlands and riparian areas as a part of construction
    - 10 DMAs report that they have local wetland mitigation banks
    - 3 report riparian mitigation banks when it is not possible to avoid impacts during development
    - 6 DMAs report other mitigation strategies including partnerships with neighboring jurisdictions, or regional entities

- Source water protection
    - 35 DMAs implement a voluntary drinking water source protection program
    - 25 DMAs implement a drinking water protection program that includes a regulatory approach
    - 6 DMAs implement a drinking water protection program that includes the acquisition of land for protection and/or conservation easements
- A few DMAs also reported the number of trees planted in the 2023 survey, which is not captured by the previous surveys.

Key changes between 2018 and 2023 riparian management survey responses

Survey responses from 2018 and 2023 show that DMAs have maintained a consistent commitment to riparian and wetland protection, while expanding the scale of their efforts. Although the proportion of DMAs implementing restoration projects has remained relatively stable, the total number and scope of projects increased significantly in 2023. The adoption of regulatory measures to strengthen riparian and wetland protection has also increased, with more jurisdictions incorporating development codes to reduce riparian vegetation losses during construction activities. Key changes between the 2018 and 2023 surveys are summarized below.

- 57 percent of DMAs report that they are implementing riparian restoration projects in 2018 and 58 percent report at least one riparian restoration project on public or private land in 2023, but the total number of restoration projects and linear feet planted greatly increased in 2023. [1]Note on measurement unit.
- 79 percent report a regulatory approach to riparian protection (ordinance or code) in 2018 and 74 percent report a regulatory approach to wetland protection, while 87 percent report that they have codes in place to reduce loss of wetlands and riparian areas during construction in 2023.

Between 2018 and 2023, riparian protection and restoration efforts have faced funding and staffing limitations, with increased reliance on volunteers and contracted crews. Jurisdictional

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[1]Note on measurement unit:

*The 2018 survey asked DMAs to report in linear feet while the 2023 survey allowed for DMAs to report in any units they chose to track restoration projects. Total estimated linear feet restored in 2018 was 91,450. This value is likely an underestimate due to the 2018 survey format. In the 2023 survey DMAs reported restoration of 170,178 linear feet of riparian corridor planted on public land and 78,174 linear feet planted on private land. DMAs reported an additional 5,403 acres planted on public land and 2,044 acres planted on private land. Finally, DMAs reported 68,478 linear feet and 11,534 acres if invasives removal in the 2023 survey.

and permitting barriers continue to hinder work on private lands. Climate change and invasive species have become more prominent environmental challenges DMAs are working to address. Limited monitoring systems and enforcement frameworks further constrain long-term restoration success specifically for private lands. Key takeaways are presented in Table 2.

Table 2. Restoration Limitations-Comparison 2018, 2023

Theme	2018 Limitations	2023 Limitations	Key Differences
Funding Constraints	- Limited funding for urban restoration and maintenance. -Reliance on external grants and partnerships	- Limited financial resources for new projects and long-term maintenance.	Persistent funding challenges, with more emphasis in 2023 on funding limitations for working on private lands.
Resource Limitations	- Insufficient staff or expertise. -Shared resources between restoration and infrastructure projects.	- Staffing constraints necessitating reliance on contracted crews and volunteers.	Staff shortages remain an issue, with 2023 emphasizing volunteer reliance and contracted support.
Private Landowner Engagement	- Lack of interest or cooperation from private landowners.	- Difficulty in accessing or implementing programs on private land due to lack of jurisdiction/resources.	More emphasis in 2023 on the inability to act on private lands due to jurisdictional constraints.
Regulatory and Planning Barriers	- Complexity in permitting, compliance, and code enforcement.	- Challenges navigating permitting and regulatory processes, especially for larger projects.	Similar issues persist, but 2023 highlights permitting difficulties specific to private properties.
Urban Development Pressures	- Limited land availability and competing urban priorities (e.g., street reconstruction).	-None reported	Emphasis on urban development pressures appears less prominent in 2023.

Theme	2018 Limitations	2023 Limitations	Key Differences
Community Engagement	- Need for broader education and volunteer involvement.	- Heavy reliance on volunteers for invasive species removal and planting, with inconsistencies noted.	Volunteer reliance noted as a limitation in 2023 due to capacity and consistency issues.
Environmental Challenges	- Poor infrastructure, erosion, invasive species, and unsuitable urban conditions.	- Concerns over climate change, invasive species (e.g., emerald ash borer), and environmental degradation.	Climate change and invasive species management emphasized more explicitly in 2023.
Invasive Species Management	- Challenges controlling invasive vegetation like ivy and knotweed.	- Specific struggles acquiring tools/resources to manage invasive species like knotweed.	Focus on resource limitations for invasive species management grows in 2023.
Monitoring and Maintenance	- Lack of monitoring metrics beyond linear stream feet for restoration efforts.	- Limited formal recordkeeping/monitoring mechanisms and insufficient funding for long-term maintenance.	2023 highlights the absence of consistent monitoring systems and funding for ongoing maintenance.
Ordinances and Codes	Not explicitly mentioned.	- Inadequate ordinances/codes to enforce riparian protections effectively.	A new issue in 2023, reflecting concerns about insufficient legal frameworks for restoration enforcement.

Conclusion

DEQ surveyed DMAs in 2013, 2018 and 2023 about actions they are implementing to help achieve TMDL load allocations. These surveys focused specifically on strategies and practices that address mercury, bacteria and temperature pollutant loading. In 2023, DMAs continued to report increasing rates of implementation for most strategies and practices compared to previous survey years. Survey responses also continued to indicate that population size and municipal separate storm sewer system permit status have an impact on the types and number of strategies and practices that DMAs are implementing. Moving forward, DEQ expects the

implementation gap between relatively larger and smaller DMAs, and MS4 permitted and non-permitted DMAs, to decrease based on more prescriptive requirements outlined in recently adopted TMDLs, such as the 2019 Willamette Basin Mercury TMDL and 2025 Willamette Subbasins Temperature TMDL.

While DMAs in all population and MS4 permit status categories are implementing a large suite of strategies and practices that help to reduce pollutant loading in the Willamette Basin, there are some stormwater measures that remain less developed. Specifically, survey results indicate that Post-Construction Stormwater Runoff programs continue to present an opportunity for increased focus and development, and Riparian Protection and Restoration programs need better tracking and reporting mechanisms.

References

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DEQ. 2019. Final Revised Willamette Basin Mercury Total Maximum Daily Load. Oregon Department of Environmental Quality.