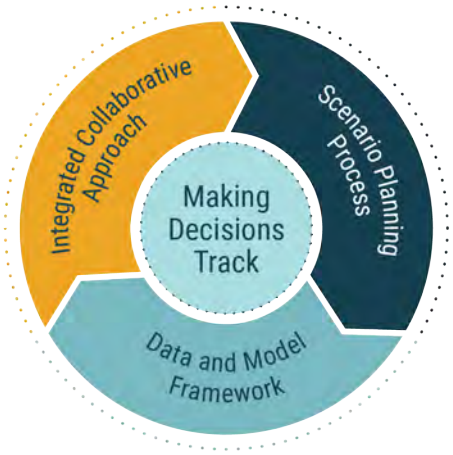
Making Decisions Track Scope of Work

Work Plan for the Great Salt Lake Basin Integrated Plan

This scope of work provides an outline of tasks to be completed to implement the three components of the Making Decisions Track of the *Work Plan for the Great Salt Lake Basin Integrated Plan* (Work Plan; refer to Figure 1).

Figure 1. Three Components of the Making Decisions Track of the Work Plan



Task 1. Integrated Collaborative Engagement

This task engages stakeholders throughout and as part of the technical analyses (see Figure 2) to develop a vested interest in results, drive consensus, and produce sustainable and durable outcomes.

Task 1.1 GSLBIP Steering Committee and GSLBIP Advisory Group Facilitation

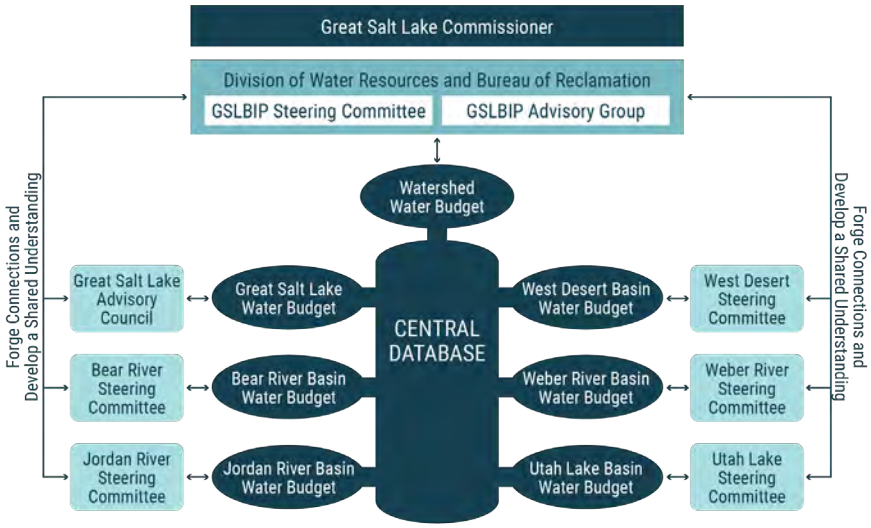
Task 1.1 Goal

Engage a diverse group of stakeholders from the Great Salt Lake (GSL) watershed to develop a consensus and vested interest in the Great Salt Lake Basin Integrated Plan (GSLBIP) process and results and drive sustainable and durable outcomes. The GSLBIP Steering Committee (SC) comprises diverse interests (nonstate and federal agencies) from across the entire GSL watershed and was originally formed in July 2023 to advise in Work Plan development. The GSLBIP Advisory Group (AG) comprises representatives from participating state and federal agencies and was formed in June 2022 to advise Utah Division of Water Resources (WRe) efforts to implement House Bill 429.

Task 1.1 Activities

1. Coordinate with the Project Team to schedule, organize, and facilitate up to ten meetings for the GSLBIP SC and up to ten meetings for the GSLBIP AG for each of the 3 years of the project period (60 meetings total). Plan for and prepare an agenda for each meeting, coordinate with presenters, organize materials, and prepare relevant presentation and discussion materials for each meeting. Publicize meetings as required. Facilitate each meeting and prepare a meeting summary. Post meeting materials and summaries on a project website.

Figure 2. Integrating Stakeholders into the Development of the Great Salt Lake Basin Integrated Plan



Complete follow-up discussions and coordination to address action items after each meeting.

2. Individually engage with each SC and AG member at least once per year to assess their level of engagement, satisfaction, and vision for the path forward.
3. Ask both groups to identify a set of values and priorities that it holds to be used to develop success metrics in subsequent tasks (Task 2).
4. Work with each group to identify, collect, organize, adapt, and develop the data required to develop a watershed water budget model (Task 3).
5. Work with each group to adapt, update and develop a watershed water budget model that represents its water budget, operations, and management structure; enables an evaluation of its water resource challenges and an assessment development of solutions and scenarios; and validates the results of river basin models (Task 3).
6. Coordinate with each group to assist with locating pertinent information, identifying concerns and challenges, understanding system characteristics and dynamics, developing and assessing ideas and solutions, and maintaining alignment with the GSLBIP.
7. Ask each group to review and approve the watershed water budget for use in the GSLBIP.
8. Ask each group to identify potential adaptation and mitigation strategies for implementation throughout the GSL watershed. Develop strategy descriptions that include each strategy's goal or purpose, key components, anticipated costs, and expected outcomes. Limit the number of strategies that are evaluated within models by the available time and budget.
9. Ask each group to review and evaluate modeling results for implementation of adaptation and mitigation strategies throughout the watershed.
10. Complete an annual situational assessment to evaluate satisfaction, ideas, concerns and understanding of the GSLBIP studies, challenges, options, solutions, and progress from interests across the watershed.
11. Summarize activities, decisions, and recommendations for the SC and AG in an annual report that can be made available on a project website.

Task 1.1 Deliverables

- Meeting agendas, meeting briefing packages for SC and AG members, and meeting summaries
- Annual reports for the SC and AG (three each)

Task 1.2 River Basin Watershed Councils and Great Salt Lake Advisory Council Facilitation

Task 1.2 Goal

Engage a diverse group of stakeholders from each of the five river basins and GSL (refer to Figure 2) to develop a consensus and vested interest in GSLBIP process and results and drive sustainable and durable outcomes.

Task 1.2 Activities

1. Coordinate with each of the five river basin watershed councils and Great Salt Lake Advisory Council (collectively referred to herein as the councils) to develop, finalize, and maintain a partnership for developing the GSLBIP. Attend each council meeting.
2. Facilitate communication and coordination among the Project Team, SC, AG, and councils.
3. Work with each council to identify individuals within each river basin or GSL to assist in developing a water budget model for their river basin or GSL.
4. Ask each council to identify a set of values and priorities that it holds to be used with the SC and AG to develop success metrics in subsequent tasks (Task 2).

5. Work with each council or their designated technical committee or subcommittee to identify, collect, organize, adapt, and develop the data required to develop a water budget model of their river basin or GSL (Task 3).
6. Work with each council or their designated technical committee or subcommittee to adapt, update, and develop a water budget model for the river basin or GSL that represents its water budget, operations, and management structure; enables an evaluation of its water resource challenges and an assessment development of solutions and scenarios; and validates the results of the Project Team's watershed water resources planning tool (Task 3).
7. Coordinate with each council to assist with locating pertinent information, identifying concerns and challenges, understanding system characteristics and dynamics, developing and assessing ideas and solutions, and maintaining alignment with the GSLBIP.
8. Ask each council to review and approve the water budget for their respective study area for use in the GSLBIP.
9. Ask each council to identify potential adaptation and mitigation strategies for implementation within their study area and throughout the GSL watershed. Develop strategy descriptions that include each strategy's goal or purpose, key components, anticipated costs, and expected outcomes. Provide these strategies to the Project Team, SC, and AG for review. Limit the number of strategies that are evaluated within models by the available time and budget.
10. Ask each to review and evaluate modeling results for implementation of adaptation and mitigation strategies within their respective study area within the framework developed by the Project Team, SC, and AG. Have councils provide review comments and recommendations to the Project Team, SC, and AG.
11. Summarize GSLBIP activities, decisions, and recommendations for each river basin and GSL in an annual report to be made available on a project website. Document and report technical data, analyses, models, findings, and recommendations from each council in a subsequent task.

Task 1.2 Deliverables

- Meeting agendas, meeting materials, and meeting summaries
- Annual reports for the GSLBIP work completed by each of the six councils (three each)

Figure 3 Scenario Planning Process

Task 2. Scenario Development

Task 2 Goal

Collaborate with the GSLBIP SC and AG to develop and finalize the list of scenarios and metrics to be used in this project to assess their impacts on the watershed's water budget (refer to Figure 3).

Task 2 Activities

1. Summarize the questions, driving forces, critical uncertainties, system performance metrics, and key constraints that need to be considered in a draft technical memorandum. Because System performance metrics are measures that indicate the ability of the GSL system to meet basin resource needs under multiple future

conditions, use these metrics to measure the potential impacts to GSL from future supply and demand imbalances and to measure the effectiveness of adaptation and mitigation strategies to address those imbalances. Do not cross key constraints (key thresholds or limits) in the system, such as salinity thresholds in GSL and minimum acceptable reliability.

2. Prepare a conceptual matrix of drivers and scenarios for SC and AG consideration.
3. Facilitate discussions with the SC and AG to finalize the questions, driving forces, critical uncertainties, and key constraints that the work will consider. Document results in an updated technical memorandum.
4. Develop a matrix of drivers and scenarios and a narrative or storyline for each scenario to be used. Have the SC and AG review the various scenarios and assist in selecting the suite of final scenarios to be used in subsequent tasks. Ensure the suite of scenarios encompasses a range of plausible future states, including different climate scenarios.
5. Work with the SC and AG to finalize the scenario narratives to be used.

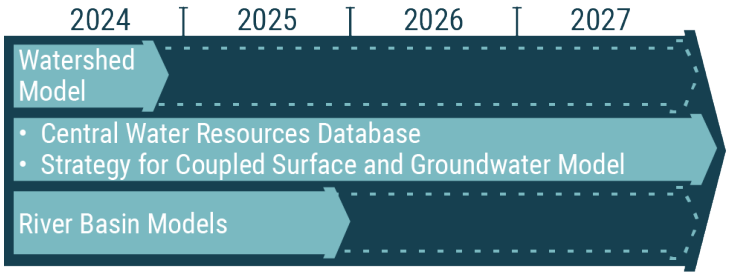
Task 2 Deliverables

- Draft and final technical memorandums documenting the factors evaluated and recommended by the SC and AG
- Draft and final scenario matrix and scenario narratives for use in the GSLBIP

Task 3. Data and Model Development

This task will be completed in a parallel process (refer to Figure 4) completed by the Project Team in conjunction with the SC and AG (refer to Task 1). Building consensus around the GSLBIP data, methods, and models will be a high priority. Task 3.4 will be completed based upon the data, models, and process developed during Tasks 3.1 through 3.3.

Figure 4. Data and Model Framework for the Great Salt Lake Basin Integrated Plan



Task 3.1 Water Resource Database Development

Task 3.1 Goal

Build a central data repository that is accessible and transparent for use by all stakeholders and in all models developed as part of the GSLBIP.

Task 3.1 Activities

1. Gather water diversion, streamflow, groundwater, irrigation methods, reservoir operations, and water distribution data from throughout the watershed.
2. Gather historical, current, and forecasted population, land use, agricultural cropping, and water use data from throughout the watershed.
3. Gather historical, current, and forecasted water supply, climate, and water demand data from throughout the watershed.
4. Plan and develop a central repository for all available data that can be accessed by participating stakeholders and used in models developed as part of the GSLBIP.

Task 3.1 Deliverable

- Database or similar storage structure to be used during GSLBIP development and implementation

Task 3.2 Watershed Water Resource Planning Tool

Task 3.2 Goal

Update the Great Salt Lake Integrated Model (GSLIM) for use in determining the water budget for the watershed; identifying potential shortages, evaluating scenarios, developing adaptation and mitigation strategies; and validating river basin models.

Task 3.2 Activities

1. Review and select model components and functionality to be included in the updated watershed water resource planning tool. Develop calibration and validation strategy for the model. Develop the post-processing approach and clearly identify the spatial and temporal scale required for each model component that will provide input to another model component or components. Also, provide post-processing, including visualization tools, to align modeling outputs to the previously mentioned performance metrics to facilitate the results analysis (Some of these tools include Tableau,1 Microsoft Power BI,2 and tailor-made web-based dashboards).
2. Develop a model scoping plan that identifies key model components, data sources, and functionality and includes a predetermined strategy for model calibration and validation (refer to *Scoping Plan for the Water Resources Planning Tool*). Have Project Team review the proposed scoping plan for consistency with the other GSLBIP models and compatibility with the river basin models.
3. Coordinate with stakeholders and participants from throughout the watershed to identify, collect, organize, adapt, and develop the data required to update GSLIM. Enable connectivity of participants with the GSLBIP water resource database to transmit, store, and validate data used in GSLIM.
4. Facilitate review of WRe VIC/RAPID methods, results, and data for use in the GSLBIP. Replace existing climate datasets and algorithms in GSLIM with new climate datasets from WRe's VIC and RAPID modeling effort. Transmit VIC/RAPID results to Utah Department of Water Quality for use in developing the functional flow framework. Store data representing each selected climate scenario in the GSLBIP water resource database for use in all GSLBIP modeling efforts.
5. Identify and develop datasets required to represent selected scenarios.
6. Update GSLIM to enable an evaluation of selected scenarios and strategies.
7. Calibrate and validate the model.
8. Document model development, data sources, algorithms, and calibration and validation results in a report.
9. Complete technical sufficiency review.

Task 3.2 Deliverables

- Updated GSLIM watershed water resource planning tool
- Report documenting data sources, algorithms, and calibration and validation results

Task 3.2 Assumption

- The watershed water resource planning tool will be operational and provide an initial assessment of the watershed water budget by the end of 2024 to enable development and evaluation of adaptation and mitigation strategies.

Task 3.3 River Basin Models

Task 3.3 Goal

Develop a water budget model for each river basin that can be used to validate the watershed water resource planning tool, evaluate selected scenarios, evaluate adaptation and mitigation strategies, and continue to be used as part of day-to-day operations after the GSLBIP is completed.

Task 3.3 Activities (for each river basin)

1. Review available datasets and models that are currently being used for water resource planning, water management and operations, and distribution (refer to *Scoping Plan for the Water Resources Planning Tool*).
2. Select model components for use in the river basin model. Preference should be given to models that are actively being used for water management and operations in the river basin. Develop the post-processing approach and clearly identify the spatial and temporal scale required for each model component that will provide input to another model component or components. Also, post-processing, including visualization tools, will be required to align modeling outputs to the previously mentioned performance metrics to facilitate the results analysis. Some of these tools include Tableau,1 Microsoft Power BI,2 and tailor-made web-based dashboards.
3. Develop a model scoping plan that identifies key model components, data sources, functionality and includes a predetermined strategy for model calibration and validation (refer to the *Scoping Plan for the Water Resources Planning Tool*). The proposed model scoping plan will be reviewed by the Project Team for consistency with the other GSLBIP models and compatibility with the watershed water resources planning tool.
4. Coordinate with stakeholders and participants from throughout the river basin to identify, collect, organize, adapt, and develop the data required to create the river basin model. Enable connectivity of participants with the GSLBIP water resource database to transmit, store, and validate data used in the river basin model.
5. Identify and develop datasets required to represent selected scenarios and evaluate potential strategies.
6. Develop the river basin model to enable an evaluation of the river basin's current and future water budget, water management and operations, selected scenarios and strategies.
7. Calibrate and validate the model.
8. Use the model to replicate scenarios evaluated using the watershed water resource planning tool. Evaluate results and reconcile differences.
9. Document model development, data sources, algorithms, and calibration and validation results in a report.
10. Complete technical sufficiency review.

Task 3.3 Deliverables

- Water budget model for each river basin
- Report documenting data sources, algorithms, and calibration and validation results for each river basin model

Task 3.3 Assumption

- River basin models will be operational by September 2025 to allow for validation of the watershed water resource planning tool and their use by their respective water shed council.

Task 3.4 Coupled Model Strategy

Task 3.4 Goal

Develop a strategy that capitalizes upon data and models developed in Tasks 3.1 through 3.3 to develop a coupled surface and groundwater model of the GSL watershed.

Task 3.4 Activities

1. Identify available data sources and models.
2. Develop a strategy to develop a coupled surface and groundwater model of the GSL watershed, including identification of key partnerships, tasks, budget, and schedule.
3. Complete technical sufficiency review.

Task 3.4 Deliverable

- Draft and final strategy for a coupled surface and groundwater model of the GSL watershed

Task 3.4 Assumption

- The fully coupled model strategy will be completed in parallel with the other Task 3 activities with the intent that the strategy can be included in the draft GSLBIP report (Task 8).

Task 4. Scenario Evaluation

Task 4 Goal

Conduct simulations of selected scenarios to identify existing and future potential water supply shortages; assess system performance; understand the sensitivity of the different drivers, uncertainties, and constraints; and identify potential adaptation and mitigation strategies (refer to Figure 3).

Task 4 Activities

1. Prepare a draft report describing current infrastructure, operations, and significant system components, watershed values, and known challenges and vulnerabilities; ask each council to contribute to this task. Have the SC and AG review this assessment and identify any information not identified by the councils. Prepare summary to inform scenario selection and evaluation and development of potential adaptation and mitigation strategies and include in a draft watershed assessment report.
2. Evaluate selected scenarios first using the watershed water resource planning tool (scenarios are assumed to include a baseline condition representing existing climate, water systems, and water demands; additional scenarios will include alternative future conditions that enable an evaluation of how different drivers, uncertainties, and constraints could influence the risk for potential future shortages in water supply and system performance).
3. Summarize quantitative results and qualitative observations for each selected scenario in updated scenario narratives for review by the SC and AG. Include the updated scenario narratives in a draft watershed assessment report.
4. Perform and summarize a sensitivity analysis of the different drivers, uncertainties, and constraints for inclusion in a draft watershed assessment report.
5. Complete an evaluation of potential risks and vulnerabilities in the watershed identified as part of the scenario evaluation, including a projected timeline for when key signposts may become apparent or key constraints are exceeded; when there may be key shifts in system dynamics, vulnerabilities, and performance; and when potential water shortages may occur for assumed conditions.
6. Recommend additional, more refined scenarios that enable a better understanding of system dynamics and adaptation and mitigation strategies that could address potential water shortages.
7. Summarize results from the scenario evaluation using the watershed water resource planning tool, in a draft watershed assessment report for review by the SC and AG.

8. Update the watershed water resource planning tool at key intervals to reflect new information from parallel GSLBIP studies. Reevaluate select scenarios based upon Project Team recommendations and SC and AG input.
9. Reevaluate selected scenarios using the new river basin models as they become available. Compare results from the river basin models with results from the watershed water resource planning tool to assess and reconcile differences. After the river basin models are accepted by the SC and AG, have the Project Team use these models to simulate and develop adaptation and mitigation strategies in subsequent tasks.

Task 4 Deliverables

- Updated scenario narratives, including quantitative results and qualitative observations
- Draft watershed assessment report documenting the water budget for the various scenarios and recommendations for further analyses and strategies to address potential water shortages

Task 5. Develop Appropriate Adaptation and Mitigation Strategies

Task 5 Goal

Develop and evaluate appropriate adaptation and mitigation strategies that achieve key GSLBIP success metrics.

Task 5 Activities

1. Further develop metrics (from Task 2) for evaluating alternative adaptation and mitigation strategies in concert with the SC and AG (refer to the *Scoping Plan for the Water Resources Planning Tool*). Develop metrics before evaluating strategies and reflect values identified by the councils. Ensure these metrics carefully consider and incorporate the values and requirements of human and natural systems, minimize short- and long-term risks, consider potential conflicts and tradeoffs, achieve the GSLBIP goal, and represent a consensus opinion of the SC and AG with input from the councils. Summarize metrics in a draft strategy to forge consensus report.
2. Building from Task 4, identify alternative strategies that will mitigate risks, adapt to and mitigate for potential water shortages, embrace the uncertainties of the future, address identified challenges, and achieve the goal of the GSLBIP. Ensure the strategies consider GSL watershed potential points of failure and how these weak points can be protected or backed up; means to build flexibility into water systems to facilitate quick response and deep recovery, means of minimizing impacts and stopping cascading losses; options to enable a return to healthy systems as quickly as possible; and options that promote active learning, rapid adaptation, and improved response. Summarize the suite of alternative strategies in a draft technical memorandum. Ensure strategies are developed with input from the SC, AG, and councils.
3. Group strategies into different portfolios that reflect new future scenarios. Incorporate preliminary results from parallel GSLBIP studies. Evaluate these scenarios using the watershed water resource planning tool. Complete a sensitivity analysis to better understand results and potential benefits and impacts. Summarize results in draft technical memorandum.
4. Review initial results with the SC, AG, and councils and adapt strategies based upon input.
5. Reevaluate selected strategies using the new river basin models as they become available. Compare results from the river basin models with results from the watershed water resource planning tool to assess and reconcile differences. After the river basin models are accepted by the SC and AG, have the Project Team use these models to simulate and develop adaptation and mitigation strategies.
6. Summarize methods, all alternatives considered, and results in draft report for review by the SC, AG, and councils.

Task 5 Deliverables

- Draft *Strategy to Forge Consensus Technical Memorandum* to be incorporated into Task 8 draft report
- Draft *Adaptation and Mitigation Strategies for Consideration Technical Memorandum* to be incorporated into Task 8 draft
- Draft Evaluation of Adaptation and Mitigation Strategies Technical Memorandum to be incorporated into Task 8 draft report
- Draft report summarizing methods, all alternatives, and results

Task 6. Tradeoff Analysis

Task 6 Goal

Determine the effectiveness, efficiency, and acceptability of the alternative adaptation and mitigation strategies to help decision-makers balance water supply and demand and avoid deterioration of agriculture, industry, communities, and ecosystems.

Task 6 Activities

1. Develop a strategy for tradeoff analysis and incorporate it into the draft strategy to forge consensus report.
2. Incorporate post-processing approach from Task 3 into a tool to complete the tradeoff analysis.
3. Document known benefits, costs, and risks for selected alternative adaptation and mitigation strategies from Task 5 (final strategies used in this analysis may be a selected, or recommended, subset of the most viable alternatives).
4. Compare the alternative strategies using success metrics developed in Task 5.
5. Complete the tradeoff analysis with the SC and AG and with input from the councils.

Task 6 Deliverable

- Update to the Task 5 draft report to include known benefits, costs, risks, and metrics for the strategies selected for consideration and summarize and incorporate input from the SC, AG, and councils

Task 7. Decision Analysis

Task 7 Goal

Forge consensus around final recommendations for actions that achieve the GSLBIP goal.

Task 7 Activities

1. Review alternative strategies and tradeoff analysis with the SC, AG, and councils.
2. Complete a decision analysis of options with the SC and AG that reflects the GSLBIP goal and objectives.
3. Finalize recommendations for inclusion in the GSLBIP.

Task 7 Deliverable

- Draft technical memorandum summarizing the alternatives and summarizing methods and results of the decision analyses to be incorporated into Task 8 draft report

Task 8. Reporting

Task 8 Goal

Document GSLBIP methods, results, and recommendations in a defensible, accessible, and transparent manner.

Task 8 Activities

1. Develop and maintain GSLBIP website to facilitate access to project datasets, discussions, decisions, alternatives, evaluations and reviews, results, and recommendations.
2. Develop a draft rollout strategy to communicate GSLBIP results and recommendations to project partners, stakeholders, and the public. Have the SC and AG review the draft rollout strategy to get their input and then finalized.
3. Compile draft technical memorandums into the draft report for review by the SC, AG, and councils (up to three report drafts may be required to address review comments). Include in the report an overview of the GSLBIP process, accomplishments, and the public participation and outreach process. Ensure the SC, AG, and councils include information in the report that appropriately reflects the work completed and recommendations made.
4. Create a new final draft report to be submitted to the Utah Legislature by November 30, 2026.
5. Implement rollout strategy.

Task 8 Deliverables

- Project website
- Draft and final rollout strategy
- Up to three draft reports
- One final draft report to be submitted to the Utah Legislature for review

Task 9. Technical Sufficiency Review

Task 9 Goal

Ensure that technical information, data, models, analyses, and conclusions resulting from GSLBIP development are technically supported and defensible.

Task 9 Activities

1. Implement the GSLBIP Technical Sufficiency Review Plan.
2. Ask reviewers to qualitatively rate and comment on how well the GSLBIP uses the best available science and clearly communicates technical methods, results, and potential conflicts of interest.

Task 9 Deliverable

- Reviewer comments for each deliverable identified in the *Technical Sufficiency Review Plan* (success will be measured by comments being adequately resolved by study participants)

Making Decisions Track Schedule

Figure 5 presents a suggested schedule for the Making Decisions Track consistent with the *Work Plan for the Great Salt Lake Basin Integrated Plan*.

Figure 5. Proposed Making Decisions Track Schedule