

RECLAMATION

Managing Water in the West

**Final Report
Managing for Excellence
Research and Development
Teams 34-35**



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PREFACE

As part of the Action Plan for Managing for Excellence (M4E), Teams 34 and 35 were formed and tasked with:

Action Item 34: Develop a plan for the continued implementation of PART (Program Assessment Rating Tool) goals for Research and Development.

Action Item 35: Reevaluate the Science and Technology (S&T) Program Steering Committee's charge to increase opportunities to meet mission-core research and development (R&D) needs in the future.

One team was established to work on both tasks 34 & 35. The Team Leader for both teams is Dennis Breitzman, Area Manager of the Dakotas Area Office, Bismarck, ND. Team members are Karl Wirkus, Deputy Regional Director of Pacific Northwest Region, Boise; Chuck Hennig, Reclamation's Research Coordinator, R&D Office, Denver; and John Johnson, Program Manager, Lower Colorado Region, Boulder City, NV.

PART is a program-specific review by the Office of Management and Budget (OMB) to evaluate program effectiveness. PART goals are established for each program reviewed by OMB and are designed to increase program effectiveness and value.

Fostering continued improvements in program effectiveness is central to both the PART goal objectives (Team 34) and steering team objectives (Team 35). As such, a single report that addresses both of these actions was determined more meaningful and efficient. The practicality of this approach was further enabled by having the same team assigned to address both actions.

To help address these actions, Team 34/35:

- Reviewed findings and suggestions from prior-year steering team meetings.
- Sought input from Reclamation's Regional Science and Technology Program coordinators and steering team members.
- Reviewed Reclamation's mission objectives and associated evolutions in the research to support Reclamation's mission.
- Interviewed Reclamation stakeholders

- Considered current and future drivers that will continue to shape Western water challenges, solutions, and the role of research.
- Reviewed recent reports published by the National Academy of Sciences and others on the role of research to meet the water resource challenges of the 21st century.
- Considered the current and evolving providers of contemporary science and research related to Western water challenges.
- Interviewed other peer federal agencies with a resource management mission.
- Reviewed the National Research Council (NRC) Report: *Managing Construction and Infrastructure in the 21st Century Bureau of Reclamation*.

EXECUTIVE SUMMARY

M4E Action Item 34

Team 34/35 finds that the Program Assessment Rating Tool (PART) goals identified for implementation are both relevant and responsive to the Science and Technology (S&T) Program responsibilities and objectives for Reclamation. However, the PART goals are not merely an exercise in counting. The PART goals and measures are at the core of new programmatic efforts intended to:

- Increase research and development (R&D) collaboration with other federal and non-federal entities that have a stake and expertise in Western water resources,
- Improve the communication and application of new, effective solutions and best practices with our water and facility managers and the stakeholders served by Reclamation project waters.
- Provide value and productivity analysis on research results, thematic areas of research, and researcher productivity in order to better steer future research investments and the application of results.

The R&D Office has initiated appropriate actions to implement and administer the programmatic efforts that underpin the associated PART goal tracking. The R&D Office will continue to make it a priority to dedicate the staff and resources toward these efforts. This has been lacking in the past and has led to delays and piecemeal efforts in implementing the PART goals.

The R&D Office has also initiated actions to develop and use contemporary interactive on-line knowledge bases and information technology to facilitate efficient integration of these program improvements and automate associated PART goal tracking.

Continued support from Reclamation leadership will help achieve the programmatic improvements initiated by the R&D Office. Regional involvement will also be essential for successful implementation. Improving regional engagement and achieving objectives that embody the programmatic objectives associated with the PART goals are consistent with the tasks to be addressed by the by the new Science and Technology Program Steering Team established under Action Item 35 (Decision memorandum signed by Commissioner Johnson on March 2, 2007). As such, no additional M4E formal recommendations or follow-on actions are necessary to implement Action Item 34 conclusions.

M4E Action Item 35

The National Research Council (NRC) findings associated with research, while not critical of the current program, have the common theme of continued improvement with an emphasis on information and technology transfer, and increased efficiency through communication, collaboration, and partnerships. Reclamation agrees with these goals and recommendations. The recent experience with incorporating broader access and competition into the S&T Program has helped identify the value of these objectives and has generated previous dialogue on processes to better achieve these objectives.

While the S&T Program has become significantly more effective at producing useful, state-of-the-art technologies, less emphasis has been placed on the overall delivery and integration of contemporary science and technology into Reclamation's mainstream. Also, while Reclamation's decentralized organization is seemingly well adapted to executing local management, it does not serve as well to promote integration across regional and area boundaries. As such, Team 34/35 identified the following objectives that the R&D Office and the next generation S&T Program Steering Committees should strive to achieve:

1. Improve both regional and Reclamation-wide awareness of science and technology knowledge gaps that challenge Reclamation's mission.
2. Expand the tracking of technology emerging from public and private efforts external to Reclamation.
3. Advance the integration across Reclamation in the conduct of R&D and deployment of successful results as solutions, best practices, and new knowledge.

4. Increase outreach and collaboration with project beneficiaries and other stakeholders.
5. Improve R&D partnership building with national, regional and local federal and non-federal research organizations.
6. Encourage additional links to universities that offer unique opportunities to leverage scientific expertise and build relationships with students as recruitment opportunities.

Team 34/35 drafted a charter for an S&T Program Steering Team that replaces the former Steering Committee with a charge to make recommendations on how to achieve these objectives. The Commissioner of Reclamation signed a decision documented on March 2, 2007 that implemented this charter. The charter and decision document can be viewed at

<http://www.usbr.gov/excellence/Finals/Team35.pdf>

The following report documents the background, context, and Team 34/35 findings that underpin the new steering team charter and the associated Commissioner decision.

National Research Council (NRC) Findings

The NRC report entitled *Managing Construction and Infrastructure in the 21st Century Bureau of Reclamation* was not critical of the Science and Technology Program and did not have findings and recommendations specific to the Science and Technology Program or the PART goals. However, since the NRC report was the primary catalyst for M4E and provided a broad perspective on 21st century Reclamation realities, Team 34/35 reviewed the entire report for insights and considerations into the role of research to meet Reclamation's 21st century challenges.

The NRC Report includes findings and makes recommendations regarding Reclamation's research activities in a general sense, and links research activities and Reclamation's laboratory services as if they are the same.

However, as currently organized, programmatic responsibility for these activities is lodged separately, and a separate M4E team was assigned to address laboratory services. Reclamation's programmatic research appropriations and activities are administered by the Research and Development (R&D) Office. Reclamation's laboratories primarily provide modeling and testing services for project specific work (e.g. dam safety modifications, river restoration projects, hydropower plant modifications, and other water and infrastructure work funded by specific project authorities). The laboratory facilities are managed by Reclamation's Technical Service Center (TSC). The R&D Office funds research that targets Reclamation's mission capabilities. Typically, only a minor part of the R&D Office funded research is carried out in the TSC based laboratories.

The R&D Office provides the following programmatic functions for Reclamation:

1. Manages and administers the Science and Technology (S&T) Program. The S&T program funds R&D projects, led by Reclamation subject matter experts, to develop solutions and know-how that enable Reclamation to manage and operate our project facilities and resources efficiently and effectively. S&T projects are awarded on a competitive basis to subject matter experts located throughout Reclamation and are not exclusive to TSC staff.
2. Implements and administers methods to share new solutions and know-how across Reclamation, with Reclamation stakeholders, the water and hydropower community, and the public and private sectors that have a stake or interest in contemporary water and hydropower solutions.

3. Forms and administers collaborative R&D approaches that bring together key competencies and expertise from other federal and non-federal entities to focus on the multi-disciplinary, multi-stakeholder Western water challenges.
4. Manages and administers the Desalination and Water Purification Research (DWPR) Program. This program implements the Water Desalination Act of 1996 and awards research grants to non-federal entities for the conduct of desalination research. The management and administration of external desalination/advanced water treatment grants funded through Title XVI has also been delegated to the R&D Office.
5. Manages and administers scientific and research related efforts directed by Congress that are Reclamation-wide in nature.

The R&D Office identifies and selects R&D projects using processes consistent with the President's R&D investment criteria to ensure quality, performance, and relevancy to Reclamation's R&D customers, which are the Reclamation water and power resource managers and the stakeholders served by Reclamation projects. The R&D Office is organizationally separated from the TSC to maintain the separation of Reclamation program responsibilities from the TSC as a fee-for-technical service organization.

Acknowledging that the NRC's findings and recommendations are presented without regard to this organizational division, Reclamation's response is organized to address research activities separately from those of the laboratory facilities. The specific NRC findings and recommendations related to research are excerpted below. Elements interpreted by the team to be specific to the R&D Office are emphasized and were considered in the Team 34/35 deliberations:

NRC Finding 3: Reclamation's laboratory and research activities came of age during the era of large dam construction in the twentieth century, when much of the needed expertise resided in the federal government and there were no laboratories capable of handling the necessary work. The needs for large materials, hydraulics, and geotechnical laboratories are much different today because **the types of capabilities needed to carry out Reclamation's mission have evolved and are available from other organizations (government, university, and private). Although the need for research on environment and resource management continues to grow,** the committee believes that the laboratory organization and its physical structure may be too large.

NRC Recommendation 3a: Reclamation's Research Office and TSC laboratory facilities should be analyzed from the standpoint of which specific research and testing capabilities are required now and anticipated for the future; which of them can be found in other government organizations, academic institutions, or the private sector; which physical components should be retained; and which kind of staffing are necessary. The assessment

should also recognize that too much reliance on outside organizations can deplete an effective engineering capability that, once lost, is not likely to be regained. In making this assessment Reclamation should take into account duplication of facilities at other government agencies, opportunities for collaboration, and the possibility for broader application of numerical modeling of complex problems and systems.

Importance of Science and Technology in the Future

Reclamation's mission of developing and managing water and power resources is fundamentally based in science and technology. Just as advances in engineering science enabled development of increasingly large, complex, and more efficient projects; advances in associated technologies are gaining importance in managing the increasing demand for that developed resource. The White House Office of Sciences and Technology Policy, Subcommittee on Water Availability and Quality, 2004 report on *Science and Technology to Support Fresh Water Availability in the U.S.*, and the 2007 report on the same subject, define the availability of fresh water in the U.S. as a critical national issue.

A National Academy of Science (NAS) 2004 report entitled, *Confronting the Nation's Water Problems: The Role of Research*, states

"...The growing complexity of water problems only reinforces this need for scientific information in fashioning new and innovative solutions. Unfortunately, although the number, complexity, and severity of water problems are growing, investment in the scientific research needed to develop a better understanding of water resources and the ways in which they are managed has stagnated."

The Water and Science Technology Board of the NRC 2001 report *Envisioning the Agenda for Water Resources Research in the 21st Century* included the following pertinent conclusions:

- The challenge of solving the nation's water problems will require a renewed national research commitment, which will include changes in the way research agendas and priorities are established.
- Water quality and water quantity need to be thought of in an integrated fashion, and research priorities should be developed in an integrated fashion.
- Relatively more attention must be given to water-related research in the social sciences and to research focused on the development of innovative institutions than has been the case in the past.

- Research on environmental water needs has emerged an important player and should remain a major part of the research agenda.

To summarize, these reports call for innovative, interdisciplinary, systems based research to solve complex water management issues. The reports stress the need for more attention to institutions and social sciences, point out the ineffectiveness of managing on an issue-by-issue basis, and call for improved coordination of existing federal, state, academic, and private sector water resources research activities using a systematic or watershed-based approach.

Evolution and Current Status of Reclamation's S&T Program

Historically, Reclamation has been a world-wide leader in engineering research; i.e., how to design and construct dams, large water delivery systems, and hydropower plants. During the dam building era, research was a separate division under the Assistant Commissioner – Engineering and Research (ACER) and predecessor organizations. The Denver Office was known as the Engineering and Research (E&R) Center, and the laboratories in Building 56 were the core of the research effort. Additional technology such as economic and agricultural science were used and advanced by Reclamation to support planning studies to determine the likely feasibility of proposed projects.

As design and construction capabilities matured within Reclamation and the Corps of Engineers, academic programs and private sector consultants, and other non-federal organizations emerged that extended the reach of these capabilities across the nation and around the world.

With Reclamation's water infrastructure in place, coupled with the demands of a growing western population, and increasingly prescriptive environmental statutes, Reclamation's primary focus shifted from designing and constructing new facilities to managing water and the associated infrastructure. Addressing these resource management demands requires the continual development, use, and advancement of technology and know-how. Recognizing that the science and solutions needed to address these challenges were at the intersection of a broad range of engineering, physical, biological, social, economic, political, legal, and other science disciplines; the S&T Program was formed in 1994 to commensurately broaden research and development. The ACER Division of Research was eliminated at that time. The technical capabilities and laboratory facilities from the Division of Research were integrated into the newly formed TSC to help service Reclamation's project-specific technical and engineering needs, and also participate in the S&T Program.

Since that time, the S&T Program has evolved through managed change from what was a mostly insular, centralized function in ACER, to the Reclamation-wide, competitive, and merit-based program that was implemented in 2004. This applied R&D program focuses on innovative solutions for Reclamation water and facility managers and Reclamation stakeholders. The program, in its current form, is well regarded both within and outside of Reclamation. The S&T Program has an annual budget that typically ranges from \$8 to \$9 million. Integration and application of the program and its products is currently managed by the R&D Office with minor collateral duty research coordinators in each region.

Findings - M4E Action Item 34

M4E Action Item 34 - Develop a plan for continued implementation of PART goals for Research and Development

The Office of Management and Budget conducted a PART analysis on Reclamation's Research and Development programs in 2004 and rated the program "effective" (<http://www.whitehouse.gov/omb/expectmore/summary/10001090.2003.html>). Three PART goals were established to foster continued improvements:

1. R&D results will generate a 10:1 return on Reclamation's R&D investment in terms of the value of the water and power benefits derived when they are deployed.
2. Implement an effective electronic knowledge base of relevant Water and Power Solution Bulletins and increase the number of bulletins added to the knowledge base each year.
3. The ratio of total program cost-share to total program budget will increase a minimum of 5 percent each year.

Team 34/35 encourages the R&D Office to continue the development and publication of Water and Power Solution Bulletins. These on-line bulletins are the primary portal for improved communications of the utility and valuation of Western water solutions. The bulletins can be accessed by both internal and external customers and provide summary information on problems to be solved, how the solution solves the problem, where it has been applied, and the valuation of the benefits derived from each application. They also provide contacts and links so that users can obtain more detailed information. The initial set of Water and Power Solution Bulletins can be viewed at:

<http://www.usbr.gov/research/science-and-tech/research/results/index.html>

Team 34/35 finds that the PART goals identified for implementation are both relevant and responsive to the S&T Program responsibilities and objectives for Reclamation. However, the PART goals selected by the R&D Office are not merely an exercise in counting. The PART goals and measures are at the core of new programmatic efforts intended to:

- Increase R&D collaboration with other federal and non-federal entities that have a stake and expertise in Western water resources.
- Improve the communication and application of new, effective solutions and best practices with our water and facility managers and the stakeholders served by Reclamation project waters.
- Provide value and productivity analysis on research results, thematic areas of research, and researcher productivity in order to better steer future research investments and the application of results.

These programmatic improvements embodied within the PART goals are also consistent with the common theme from the NRC Report of continued improvement with an emphasis on information and technology transfer, and increased efficiency through communication, collaboration, and partnerships.

The tracking of the cost-share goal has been implemented with a benchmark annual cost-share ratio of 0.77. Implementation of the other two goals is in progress but encountered delays because of the significant efforts associated with implementing the programmatic improvements that underpin the PART goals. To achieve these new programmatic improvements, successful implementation depends on staff and resources dedicated to technology transfer, outreach, and communication functions.

The R&D Office has initiated appropriate actions to implement and administer the programmatic efforts that underpin the associated PART goal tracking. The R&D Office will continue to make it a priority to dedicate the staff and resources toward these efforts. This has been lacking in the past and has led to delays and piecemeal efforts in implementing the PART goals.

The R&D Office has also initiated actions to automate as many functions as possible by using state-of-the-art, interactive, online knowledge bases and a valuation calculator for research results. These on-line tools will minimize efforts to administer the PART goals in the future, and will allow effective communication and information sharing between researchers and the end-users of research both within and external to Reclamation. Continued support from Reclamation's leadership will help the R&D Office achieve the programmatic improvements that have been initiated. Successful implementation and tracking of these PART goals and their underlying programmatic efforts will also require involvement by the Regions. As such, methods to achieve this essential regional

involvement should be considered in evaluating and implementing the findings and options presented for M4E action item 35.

Findings - M4E Action Item 35

M4E Action Item 35: Reevaluate the Science and Technology (S&T) Program Steering Committee's charge to increase opportunities to meet mission-core R&D needs in the future

The NRC findings associated with research, while not critical of the current program, have the common theme of continued improvement with an emphasis on information and technology transfer, and increased efficiency through communication, collaboration, and partnerships. Reclamation agrees with these goals and recommendations. The recent experience with incorporating broader access and competition into the S&T Program has helped identify the value of these objectives and has generated previous dialogue on processes to better provide achieve these objectives.

While the S&T Program has become significantly more effective at producing useful, state-of-the-art technologies, less emphasis has been placed on the overall delivery and integration of contemporary science and technology into Reclamation's mainstream. Also, while Reclamation's decentralized organization is seemingly well adapted to executing local management, it does not serve as well to promote integration across regional and area boundaries. As such, Team 34/35 identified the following objectives that that the R&D Office and the next generation S&T Program Steering Committees should strive to achieve:

1. Improve both regional and Reclamation-wide awareness of science and technology knowledge gaps that challenge Reclamation's mission.
2. Expand the tracking of technology emerging from public and private efforts external to Reclamation.
3. Advance the integration across Reclamation in the conduct of R&D and deployment of successful results as solutions, best practices, and new knowledge.
4. Increase outreach and collaboration with project beneficiaries and other stakeholders.
5. Improve R&D partnership building with national, regional and local federal and non-federal research organizations.

6. Encourage additional link(s) to universities that offer unique opportunities to leverage scientific expertise and build relationships with students as recruitment opportunities.

Team 34/35 drafted a charter for an S&T Program Steering Team that replaces the former Steering Committee with a charge to make recommendations on how to achieve these objectives. The Commissioner of Reclamation signed a decision documented on March 2, 2007 that implemented this charter. The charter and decision document can be viewed at <http://www.usbr.gov/excellence/Finals/Team35.pdf>

Seven senior Reclamation managers (one from each region, one from the Office of Program and Policy Services, one from the Technical Service Center) have served as members of the former S&T Program Steering Committee as a minor collateral duty assignment along with a cross section of representatives from other federal agencies, universities, and Reclamation stakeholders. The steering committee typically met once per year to help guide programmatic R&D priorities as well as the restructuring of the S&T Program to the current Reclamation-wide, competitive, merit based program. Once this restructuring was in place, the former steering committee made the following observations in 2004:

Current Finding:new program practices and program management are headed in the right direction to demonstrate a credible program that best meets the current and emerging needs of Reclamation water users, water managers, and stakeholders.

Future Objective: more engagement between the S&T Program and the Region and Area Offices would help broadly share program solutions and findings and speed their application into Reclamation operations. This would also cultivate a sharper focus on the most relevant problems that face Reclamation because water and facility managers would be able to have more opportunity to provide input into the R&D direction for Reclamation.

This overall objective is very consistent with the central theme of the six key objectives identified above by Team 34/35 for the new S&T Program Steering Team charter.

Additional Considerations for Future S&T Steering Team Deliberations – Team 34/35 engaged in extensive deliberations on options that the new S&T Program Steering Team may want to eventually consider on how to achieve the six-key objectives identified in the new Steering Team charter. Although this discussion exceeded the charge given to Team 34/35, the team provides the following summary of these deliberations for future consideration.

The former S&T Program Steering Committee approach worked well to help guide the recent restructuring of the program and establish general priorities for mission-relevant research. However, this approach only utilized intermittent input

from managers on a minor, collateral-duty assignment basis. This approach would not be well suited to achieve the six key objectives because the core job responsibilities of these managers demand their full time and attention. As such, they cannot provide the day-to-day focus and hands-on approach that would be necessary to achieve the level of engagement that would be necessary to accomplish these six objectives. In addition, as collateral duty assignments, Steering Committee membership continuity has, and would be expected to continue to be compromised on an annual basis.

A team of science advisors that are funded by the R&D Office and dedicated to the cause of being accountable to the Regional Directors, the Director of Operations, and Reclamation project stakeholders to understand, advocate, and broker their scientific needs could help achieve the six key objectives incorporated into the new S&T Program Steering Team charter.

The integration of a team of science advisors would not be directed solely at the S&T Program, but would include enhancing Reclamation's overall ability to more effectively and efficiently transfer and share not just research and technology, but other scientific practices and procedures. A short list of examples for application beyond the S&T program include: procedures for accomplishing peer review and compliance with the data quality act; procedures and processes for successful adaptive management; procedures for biological risk assessment; hydrologic modeling; and climate change science integration into water operations and planning.

Within the existing organization and budget, the R&D Office could co-fund a full-time science advisor for each region. Collectively, the regional science advisors and R&D Office could work with the current co-lateral duty regional S&T Program coordinators to serve as Reclamation's Science and Technology Integration Team. This approach replicates the model formed by Reclamation's Dam Safety Program that is internationally recognized as an effective program. The Dam Safety Program is able to administer an effective, unified program, across Reclamation that serves Reclamation management with contemporary advice and efficient actions in large part because of the dedicated Regional Dam Safety Program manager located in each Regional Office and an additional program manager counterpart located in the Dam Safety Office.

The National Park Service (NPS) implemented a similar science advisor network about ten years ago. Mr. Bob Moon, Deputy Regional Director for the NPS Intermountain Region, is convinced this organization has greatly increased the agency's effectiveness in the delivery and integration of science into its management objectives. He also stated they are able to do a great deal more in the research and development arena, per dollar of investment, because of the external partnerships that have been established. Their primary external provider of scientific studies and research is the Cooperative Ecosystem Study Units (CESU) network of universities.

A Reclamation science advisor could be a senior level person with the capability and responsibility to be generally familiar with the current landscape of scientific needs and applications within each region, across Reclamation, and the scientific community. The team of science advisors would be responsible for understanding the responsibilities and challenges facing Reclamation water and facility managers and the project beneficiaries served by Reclamation projects, and would become their voice, advocate, and broker for the useful and practical scientific information and solutions that are most relevant to their needs. As both a regional and a corporate resource for mission-core scientific needs and capabilities, the individual and collective expertise of the science advisors could recommend applications and integration of scientific information into both regional and Reclamation-wide programs and practices. The qualities of a successful science advisor would likely include:

- Being expert in a science that is strongly aligned with Reclamation’s water management mission.
- Demonstrating multidisciplinary capabilities by possessing a strong knowledge of the full range of sciences that intersect Reclamation’s mission.
- Demonstrating strong collaborative competencies and communication skills across the Western water technical, management, and stakeholder communities.
- Demonstrating awareness and understanding of the non-scientific drivers that are a reality of water management decisions.

A network of Reclamation science advisors could collectively provide, or obtain, expert advice across the full range of the sciences that will underpin Reclamation’s ability to meet 21st century Western water management challenges.

Since only a small portion of the research, development, and application of new technologies being done in Reclamation is funded and tracked by the S&T Program, the science advisors could also track other research; e.g., studies associated with EISs and biological opinions, new technologies applied in site-specific facility maintenance, etc., and disseminate the results and best practices as appropriate.

Expenses associated with these new positions – salaries, benefits, travel – could be paid by the R&D Office through the S&T Program, unless the employee is working on a specific, non-S&T Program, in which case they could direct charge their expenses. No increase in the S&T Program budget for these expenses would be necessary. Team 34/35 believes the efficiencies gained by increased collaboration and integration within and external to Reclamation would more than offset the redirection of budget within the S&T Program.

Such a science advisor network could also increase Reclamation collaboration and partnerships with local and regional entities such as states, communities, water districts, private organizations, state universities, and CESUs (Cooperative Ecosystem Study Units) which should result in increased cost-sharing opportunities. These opportunities could result in less reliance on Reclamation staff to solely conduct studies, and more opportunities to combine outside expertise with Reclamation expertise for stronger, more flexible science and technology solution resources. The science advisor network could also provide resources that would enable the R&D Office to expand collaborations at the national level and influence other federal and academic scientific programs to focus their efforts and resources toward the most relevant Western water challenges. The R&D Office has already demonstrated this potential by forming increased awareness and collaboration on Western water challenges with the U.S. Department of Commerce (NOAA and NIST), U.S. Department of Agriculture (ARS, CREES, Forest Service), USGS, NASA, and the University-based Water Resources Research Institutes. However, achieving the full potential is limited due to the time constraints of existing R&D Office staff.

A Reclamation region/corporate Science and Technology Integration Team, with a network of science advisors at the core, could programmatically customize and integrate science and technology throughout Reclamation, and could facilitate communication with customers, stakeholders, and Area Offices to determine specific research needs at the project and programmatic level. A formal network of science advisors could also facilitate the dissemination of information and technology transfer, including implementing Reclamation's R&D PART goals, which are designed to increase the transfer and integration of emerging solutions, best practices, and contemporary science and technology into Reclamation's mainstream. At the discretion of the Regional Directors, the science advisors could also become involved in science beyond the S&T Program as determined by the Regional Directors, and the end result should be better informed and more efficient planning and decision making.

In summary, Team 34/35 believes a science advisor network has many possibilities. However the opportunities, details, difficulties, and implementation issues would need further deliberations by the new S&T Program Steering Team and others to make informed, efficient decisions about this approach. The Pacific-Northwest Region, Director of Technical Resources, and the R&D Office have initiated a pilot science advisor project that will provide a more informed basis to evaluate this as workable, beneficial approach. The pilot program will be conducted over a 1 to 2 year period and has evaluation metrics designed into the pilot program.