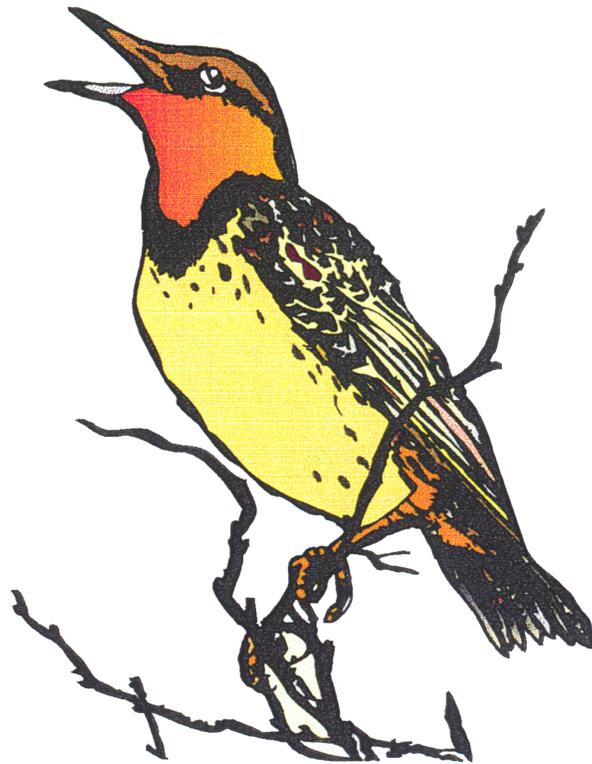


HANDBOOK OF WESTERN RECLAMATION TECHNIQUES

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These varied techniques have worked or are working for the technique author(s). However, the author(s) or editor(s) cannot warrant a technique. Sites, contractors, materials, specifications, and expectations differ.

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INTRODUCTION

The Handbook of Western Reclamation Techniques is the culmination of cooperative effort of the mining industry, industry professionals, the academic community, and regulatory agencies. It is designed to document field proven reclamation methods. The field techniques described herein demonstrate the variety of different methodologies utilized to accomplish similar tasks. Many of these techniques were developed from scientific studies and have evolved over time. Although mining has occurred for over a century, concerted reclamation efforts for coal mines began in response to laws such as the Wyoming Environmental Quality Act (WEQA) of 1973, and the Surface Mine Control and Reclamation Act (SMCRA) of 1977. Reclamation that has been successful allows surface coal mine operators to redeem bonds that were posted prior to the initial disturbance. These reclamation bonds are required by SMCRA and WEQA.

The roots of reclamation science lie in the conservation practices developed during the dustbowl and depression years of the 1930's. Many of the practices developed, and much of the work done during that time, was funded by Federal and State governments. For this reason, many of the names associated with early reclamation of mined lands -- McKell; Bjugstad; Power, Sandoval, and Ries; Aldon; Plummer; Richardson and Farmer; and Hodder -- are also names from the Soil Conservation Service, the Agricultural Research Stations, and land grant universities. Early mine reclamation was so associated with agriculture that reclamation and revegetation were considered virtually synonymous.

While some agricultural emphasis continues today, the technology has expanded greatly to embrace hydrology, wildlife, and compliance. Reclamation science has responded to legal requirements, reconstruction of endangered habitats, revitalization of damaged environmental systems, and establishment of wetlands. Reclamation methods are used to minimize the impact of human development in housing subdivisions, on ski slopes, and in highway reconstruction.

Early reclamation investigations in the arid and semi-arid Western United States were based on research trials for replacing soils and re-establishing vegetation. Cook et al. (1974), Power et al. (1976), the SEAM program (1979), and DePuit and Coenenberg (1981) are good examples of earlier efforts that continue today in work by Schumann et al. (1993). Plant materials centers and agricultural research stations continue to provide tools for reclamation efforts (e.g. Ries et al. 1976, Aldon 1981, Bjugstad 1984, and Majerus et al. 1985).

Researchers such as Shroeder (1985), Toy (1983), and Toy and Parsons (1987) produced research on geomorphic processes such as erosion, infiltration, and sediment yield, while Beauchamp (1973), Dollhopf (1978), Berg (1983), and Halvorson and Doll (1985) investigated spoil and soil in the reclaimed environment. A great deal of applied research has been conducted by

mining companies interested in seeking new solutions to reclamation problems. Much of this work is reported in the annual reports required by State agencies for each active mine.

Postovit (1981), Hingtgen and Clark (1984a and 1984b), Yoakum (1984), Clark and Medcraft (1986), and Medcraft and Clark (1986) studied the effects of mining on wildlife populations. Olendorf et al. (1981) and Nelson et al. (1978) described techniques for wildlife habitat restoration. Methods and classification for reconstruction of stream channels are being developed by Wesche et al. (1993) and Rathburn et al. (1993).

There are many works which suggest technologies of various kinds, report on field trials, and recommend plant species for use in reclamation. However, twenty years after the earliest efforts, a considerable body of practical knowledge has been developed among the specialists charged with the duty of complying with State and Federal statutes and regulations governing reclamation of mined lands. For the most part this knowledge has never been formalized and made generally accessible until presentation in this handbook.

The Handbook of Western Reclamation Techniques was designed in a binder format with the capability of adding or replacing sections as new techniques are developed. Plans and diagrams can be easily removed to make working copies of a subsection. This handbook has been written and assembled by the volunteer labor of interested authors and a smaller volunteer editorial committee. Many of these people gained their experience in the surface coal mines of Wyoming. ACML funds were utilized for support services such as administration, assembly, drafting, literature review, and word processing. We are grateful for the printing of this handbook by the Office of Surface Mining.

It is the intent of the authors to present, in an accessible format, economical and successful reclamation techniques that have survived the test of practical application. Many of the techniques are a cumulation of scientific studies and practical experience. Since some of these methodologies may not have been previously documented, the authors feel compiling this handbook is an important contribution to reclamation. It is the hope of the authors that the distribution of these techniques will positively affect not only the reclamation of surface coal-mined lands, but will also be of potential service in many reclamation fields.

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