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INTRODUCTION

This Job Family Standard (JFS) provides series definitions, titling instructions, and grading criteria for nonsupervisory professional work in the Natural Resources Management and Biological Sciences Group, 0400, for General Schedule and other “white collar” pay plans. In the General Schedule position classification system established under chapter 51 of title 5, United States Code, the positions addressed here would be two-grade interval positions.

This JFS is divided into three parts. Part I contains occupational information that is applicable to Federal work covered by the JFS without regard to pay plan or classification system. Part II provides the grading criteria for positions classified in accordance with GS grade definitions. Part III includes explanatory material about the development of this JFS.

The term “General Schedule” or “GS” denotes the major position classification system and pay structure for white collar work in the Federal Government. Agencies no longer subject to chapter 51 have replaced the GS pay plan indicator with agency-unique pay plan indicators. For that reason, reference to General Schedule or GS has been omitted from much of this JFS.

COVERAGE

This job family standard covers the following occupational series:

Series	Series
General Natural Resources Management and Biological Sciences 0401	Genetics 0440
Microbiology 0403	Rangeland Management 0454
Pharmacology 0405	Soil Conservation 0457
Ecology 0408	Forestry 0460
Zoology 0410	Soil Science 0470
Physiology 0413	Agronomy 0471
Entomology 0414	Fish and Wildlife Administration 0480
Toxicology 0415	Fish Biology 0482
Botany 0430	Wildlife Refuge Management 0485
Plant Pathology 0434	Wildlife Biology 0486
Plant Physiology 0435	Animal Science 0487
Horticulture 0437	

MODIFICATIONS TO AND CANCELLATIONS OF OTHER EXISTING OCCUPATIONAL SERIES AND STANDARDS

Issuance of this JFS establishes, renames, supersedes, or cancels occupational series and classification standards as described in the following table.

Previous Series or Guidance	Action Taken / How to Classify Work Previously Covered
Biological Sciences Group 0400	<ul style="list-style-type: none"> • Renames this occupational group, the Natural Resources Management and Biological Sciences Group, 0400.
General Biological Science 0401	<ul style="list-style-type: none"> • Renames this series, the General Natural Resources Management and Biological Sciences Series, 0401. • Revises the series definition.
Microbiology 0403	<ul style="list-style-type: none"> • Supersedes this classification standard, last revised in December 1962.
Pharmacology 0405	<ul style="list-style-type: none"> • Supersedes this flysheet, last revised in July 1987.
Agricultural Extension 0406	<ul style="list-style-type: none"> • Cancels this series. • Requires no further action as this series had no population as of the cancellation date.
Ecology 0408	<ul style="list-style-type: none"> • Supersedes this flysheet, last revised in June 1977.
Zoology 0410	<ul style="list-style-type: none"> • Supersedes this flysheet, last revised in June 1967.
Physiology 0413	<ul style="list-style-type: none"> • Provides occupational information and grading criteria for this series, which previously had no classification standard.
Entomology 0414	<ul style="list-style-type: none"> • Supersedes this classification standard, last revised in June 1964.
Toxicology 0415	<ul style="list-style-type: none"> • Supersedes this flysheet, last revised in July 1987.
Botany 0430	<ul style="list-style-type: none"> • Supersedes this flysheet, last revised in April 1966.
Plant Pathology 0434	<ul style="list-style-type: none"> • Provides occupational information and grading criteria for this series, which previously had no classification standard.
Plant Physiology 0435	<ul style="list-style-type: none"> • Supersedes this flysheet, last revised in April 1966.
Plant Protection and Quarantine 0436	<ul style="list-style-type: none"> • Cancels this series. • Cancels this classification standard, last revised in December 1980. • Classify work previously covered by this series to the General Natural Resources Management and Biological Sciences Series, 0401.
Horticulture 0437	<ul style="list-style-type: none"> • Supersedes this flysheet, last revised in October 1964.
Genetics 0440	<ul style="list-style-type: none"> • Provides occupational information and grading criteria for this series, which previously had no classification standard.
Rangeland Management 0454	<ul style="list-style-type: none"> • Supersedes this classification standard, last revised in September 1993.
Soil Conservation 0457	<ul style="list-style-type: none"> • Supersedes this classification standard, last revised in March 1987.

(continued)

Previous Series or Guidance	Action Taken / How to Classify Work Previously Covered
Forestry 0460	<ul style="list-style-type: none"> Supersedes this classification standard, last revised in January 1980.
Soil Science 0470	<ul style="list-style-type: none"> Supersedes this classification standard, last revised in June 1970.
Agronomy 0471	<ul style="list-style-type: none"> Supersedes this classification standard, last revised in February 1961.
General Fish and Wildlife Administration 0480	<ul style="list-style-type: none"> Provides occupational information and grading criteria for this series, which previously had no classification standard or flysheet. Renames the series the Fish and Wildlife Administration Series, 0480.
Fish Biology 0482	<ul style="list-style-type: none"> Supersedes this classification standard, last revised in January 1991. Renames this series, the Fish Biology Series, 0482.
Wildlife Refuge Management 0485	<ul style="list-style-type: none"> Supersedes this classification standard, last revised in May 1990.
Wildlife Biology 0486	<ul style="list-style-type: none"> Supersedes this classification standard, last revised in January 1991.
Animal Science 0487	<ul style="list-style-type: none"> Supersedes this flysheet, last revised in April 1983.
Home Economics 0493	<ul style="list-style-type: none"> Cancels this series. Cancels this classification standard, last revised in June 1967. Classify work previously covered by this series to the Dietitian and Nutritionist Series, 0630, or the General Health Science Series, 0601, as appropriate.

PART I – OCCUPATIONAL INFORMATION

Part I is intended for use by all agencies in evaluating professional positions in the Natural Resources Management and Biological Sciences Group, 0400. It provides series definitions, titling instructions, and detailed occupational information for this job family.

GENERAL SERIES DETERMINATION GUIDELINES

For a variety of reasons, selection of the correct series for a position is an essential part of the entire human resources management process. For example, qualification requirements used in recruiting are based on the series of the position; career ladders are influenced by the series; and organizational structure is often designed with consideration of the series of assigned positions.

Determining the correct series for a position is usually apparent by reviewing the assigned duties and responsibilities and then comparing them to the series definitions and general occupational information the job family standard (JFS) provides. Generally, the series determination for a position is based on the primary work of the position, the highest level of work performed, and the paramount knowledge required to do the work of the position. Normally, it is fairly easy to make this decision. However, in other instances, determining the correct series may not be as obvious.

Use the following guidelines to determine the predominant series when the work of a position matches more than one job family or occupational group. Also, when the work of a position falls into more than one series within this job family, it may be difficult to determine which particular series predominates. In such situations, apply the guidelines below in the order listed to determine the correct series.

- **Paramount knowledge required.** Although there may be several different kinds of work in the position, most positions will have a paramount knowledge requirement. The paramount knowledge is the most important type of subject matter knowledge or experience required to do the work.
- **Reason for existence.** The primary purpose of the position or management's intent in establishing the position is a positive indicator for determining the appropriate series.
- **Organizational mission and/or function.** Positions generally align with the mission and function of the organization to which they are assigned. The organization's function is often mirrored in the organizational title and may influence the appropriate series.
- **Recruitment source.** Supervisors and managers can help by identifying the occupational series that provides the best qualified applicants to do the work. This is closely related to the paramount knowledge required.

Although the work of some positions may require applying professional mathematical or related knowledge and skills, classification as professional positions in the Natural Resources Management and Biological Sciences Group, 0400, may not be appropriate. The [Additional Occupational Considerations](#) section of this JFS provides examples where the work may involve applying related knowledge and skills, but not to the extent that it warrants classification to this job family.

Additional information may be found in OPM's publication [The Classifier's Handbook](#).

CLASSIFYING PROFESSIONAL SCIENTIFIC WORK

Professional scientific work involves exercising discretion, analytical skill, judgment, and personal accountability and responsibility for creating, developing, integrating, applying, and sharing an organized body of knowledge that characteristically is:

- uniquely acquired through extensive education or training at a recognized college or university;
- equivalent to the curriculum requirements for a bachelor's or higher degree with major study in or pertinent to the specialized field; and
- continuously studied to explore, extend, and use additional discoveries, interpretations, and applications to improve data quality, materials, equipment, applications, and methods.

Interdisciplinary Professional Positions

An interdisciplinary position is a position involving duties and responsibilities closely related to more than one professional occupation. As a result, you could classify the position into two or more professional occupational series. The nature of the work is such that persons with education and experience in two or more professions may be considered equally well-qualified to do the work. In both categories the position description should show clearly that the position is interdisciplinary and indicate the various series in which the position could be classified. The final classification of the position is determined by the qualifications of the person selected to fill it.

For further guidance on the use and classification of interdisciplinary positions, refer to [The Classifier's Handbook](#).

DISTINGUISHING BETWEEN PROFESSIONAL AND TECHNICAL WORK

It is important to determine whether a position is comprised of technical or professional work. It is not always easy to differentiate between the two because some tasks are common to both. The developmental work of professional positions and the demanding work of high level technical positions are sometimes similar. Typical distinctions between technician and professional work follow.

Professional Work Involves:

- creating, exploring, evaluating, and sharing solutions for scientific, engineering, and/or architectural problems, conditions, and issues;
- applying a range and depth of knowledge acquired specifically through an intensive learning regimen of the phenomena, theories, and assumptions of a scientific body of knowledge;
- understanding theories and assumptions, principles, and their relationships underlying the practices of a professional science discipline, an industrial area, or technology;
- identifying, analyzing, advising, consulting, and reporting on scientific, theoretical, and factual data, conditions, and problems;
- assessing, resolving, and predicting the relationships and interactions of data and findings under varying conditions;
- reasoning from existing knowledge and assumptions in a professional field to unexplored areas and phenomena;
- staying abreast of and evaluating scientific subjects, analyses, and proposals in professional literature;
- positions with these common points:
 - the work offers opportunity to apply professional knowledge and skills;
 - management determination that the work requires knowledge of scientific, engineering, and/or architectural theories, assumptions, interactions, and relationships; and
 - the work explores, creates, and extends solutions and applications of a particular professional science discipline, industry, or technology.

Technical Work Involves:

- using and completing recurring methods, standardized procedures, and established processes for a specialized field in industry, technology, or science;
- applying knowledge acquired through practical experience and on-the-job activities in the recognized processes, standards, methods, and their corresponding scientific principles and results;
- understanding and applying predetermined procedures, methods, and standardized practices or approaches in a specialized field of industry, technology, or science;
- carrying out tasks, methods, procedures, and computations based on oral instructions and/or precedents, guidelines, and standards;
- collecting, observing, testing, and recording factual and scientific data within the oversight and management of professional employees;
- foreseeing the effects of procedural changes or appraising the validity of results on the basis of experience and practical reasoning;
- staying abreast of existing and new practical methods and applications through on-the-job and classroom training;
- positions with these common points:
 - the work offers opportunity to apply practical knowledge and skills;
 - management determination that the work requires knowledge of practices, methods, and standards by which materials, devices, equipment, and/or natural resources are made useful; and
 - the work supports and/or is associated with a particular industry, technology, or a professional scientific, engineering, or architectural field.

OFFICIAL TITLING PROVISIONS

Title 5, United States Code, requires OPM to establish the authorized official position title that includes a basic title (e.g., Mathematical Statistician) that may be appended with one or more prefixes and/or suffixes. Agencies must use the official position titles for human resources management, budget, and fiscal purposes. Instructions for assigning official position titles are provided for specific series in this section.

Supervisors and Leaders

- Add the prefix “Supervisory” to the basic title when the agency classifies the position as supervisory. If the position is covered by the General Schedule refer to the [General Schedule Supervisory Guide](#) for additional titling and grading information.
- Add the prefix “Lead” to the basic title when the agency classifies the position as leader. If the position is covered by the General Schedule refer to the [General Schedule Leader Grade Evaluation Guide](#) for additional titling and grading information.

Research Positions

- Add the prefix “Research” to the basic title when the work satisfies the criteria for research as defined in the [Research Grade Evaluation Guide](#).

Specialty or Parenthetical Titles

OPM does not prescribe parenthetical titles for the basic position titles required in this JFS. Agencies may supplement basic position titles with agency-established parenthetical titles if necessary for recruitment or other human resources needs.

Organizational Titles

Organizational and functional titles do not replace, but complement official position titles. Agencies may establish organizational and functional titles for internal administration, public convenience, program management, or similar purposes. Examples of organizational titles are Branch Chief and Division Chief. Examples of functional titles are Chief of Operations and Chief of Policy Development.

FUNCTIONAL CLASSIFICATION CODES

Functional Classification for Professional Work. The National Science Foundation (NSF) manages a system of functional classification codes to describe the work done by scientists and engineers. NSF uses these data to conduct studies of the science and engineering workforce. To meet the needs of the NSF, OPM requires agencies to document and maintain functional classification codes for positions in science and engineering occupations. [The Guide to Personnel Data Standards](#) provides a list of the applicable occupations and definitions of the functional classification codes. Use established internal agency procedures to assign the appropriate code for positions covered by series in this JFS. A complete list of valid functional classification codes is given below.

Category	Code
Research	11
Research contract and grant administration	12
Development	13
Testing and evaluation	14
Design	21
Construction	22
Production	23
Installation, operations, and maintenance	24
Data collection, processing, and analysis	31
Scientific and technical information	32
Standards and specifications	41
Regulatory enforcement and licensing	42
Natural resource operations	51
Clinical practice, counseling, and ancillary medical services	81
Planning	91
Management	92
Teaching and training	93
Technical assistance and consulting	94
Other – Not elsewhere classified	99

INTRODUCTION TO THE NATURAL RESOURCES MANAGEMENT AND BIOLOGICAL SCIENCES GROUP, 0400

This occupational group covers work of the biological sciences and natural resources management work that requires knowledge of the biological sciences. Work in this occupational group may be done in research and development organizations, regulatory and control agencies, public health and medical laboratories, and environmental and natural resources organizations.

Biological Sciences

Biological science attempts to understand the processes of living matter in all forms, but especially its origin, growth, structure, and function. Biological scientists study living organisms and their relationship to their environment. The studies provide insight into life processes and transitions, problems of living matter as they relate to human issues, and preserving and repairing the natural environment. The work may involve research and development, regulatory activities, testing and analysis of laboratory samples, or a combination of all of these activities. Research and development involves extending the body of scientific knowledge. Biological scientists plan and conduct research experiments using cells, laboratory animals, or greenhouse plants. Typical experiments may involve:

- analyzing the structure and function of cells and tissues;
- isolating and characterizing viruses, parasites, bacteria, and fungi;
- clarifying the role of nutrition in blindness and visual impairment;
- identifying species based on anatomy, physiology, and behavior;
- investigating the relationships of life cycles and habitat requirements of vertebrates; and
- analyzing changes in forest biomass and health.

The goal of regulatory activities is to protect public health and safety and improve agricultural production and commerce. Regulatory work involves:

- defining legal standards and recognizing the need for and initiating new and amended legislation, regulations, and policies for the composition, safety, and efficacy of regulated products;
- conducting studies to support regulatory decisions;
- advising on the regulatory impact of scientific advances, product development, technological progress, environmental impact, and industrial innovations;
- evaluating critical public health and hazard issues; and
- developing and evaluating plans to ensure compliance with environmental laws.

Laboratory work may involve testing samples of food products, drugs, air, or water for purity, potency, and safety. The work may include inspecting production facilities for conformance with approved methods and procedures. Testing may involve difficult analyses or test protocols and communicating test results through reports or live testimony in court. Typical duties are:

- evaluating applications for developing and marketing of drugs, foods, food additives, medical devices, and cosmetics; and

- conducting post-market analyses to ensure products are safe and effective; post-market analyses may involve assessing the impact and significance of reports of contamination, injuries, toxicity, sensitivity, reactions, and carcinogenic and other side effects due to use, contact with, or consumption of products.

Understanding the complexities of these matters frequently requires knowledge and expertise in both a primary scientific discipline and one or more related scientific disciplines. For example, zoology may require knowledge of cell biology, herpetology, limnology, ornithology, and chemistry.

Natural Resources Management

The natural resources that are most relevant to the 0400 job family are water, land, food, plants, animals, and soils. Natural resources work may involve administrative or managerial duties, such as controlling, preserving, and/or evaluating a natural resource or natural resources function, such as conservation, forest, rangeland, fisheries, and wildlife. The work may have specific geographic boundaries (for example, management of a national wildlife refuge). The natural resources management work covered by this JFS requires knowledge and skill sufficient to interpret and apply biological science and research. The work further requires knowledge of one or more of the following:

- management concepts, principles, and practices;
- biological, agricultural, natural, and pertinent aspects of social, behavioral, cultural, and economic sciences;
- theories, concepts, and practices of conserving, utilizing, and sustaining natural, physical, and cultural resources of forests and associated land and water;
- fire ecology; and
- public recreational needs in terms of cultural, sociological, educational, and historical factors.

Examples of this work are:

- protecting sensitive habitats;
- preparing or advising on natural resources regulations and guidance;
- ensuring that activities on public land, such as hunting and boating are conducted in accordance with applicable laws;
- developing environmental reports and impact statements;
- developing and implementing land use plans;
- identifying problems associated with public and private land use, such as mining and drilling operations, utility corridors, road and highway development, or telecommunications facilities;
- managing and issuing permits;
- monitoring construction, production, and reclamation activities to ensure compliance with environmental plans and stipulations;
- coordinating the surveying, monitoring, analyzing, and evaluating of natural resources to permit multiple land uses while preserving the area's ecological viability;
- managing special areas, such as Congressionally designated wilderness, wild and scenic rivers, national recreation areas, and national scenic trails;

- managing wildlife and fisheries;
- protecting threatened and endangered species and sensitive plants;
- managing wildland fire programs;
- managing recreation programs; and
- managing forests.

Two significant natural resources management functions are fire program management and recreation management. Fire program management involves advising on, administering, supervising, or performing professional fire management work. In addition to a foundation knowledge in the biological and natural sciences, this work requires knowledge of fire behavior, fire fighting techniques, and wildland fire management theories, concepts, principles, and standards. Typical fire program management activities are:

- assessing actual and potential fire effects on riparian areas, soil erosion, air quality, wildlife habitats, and cultural, commercial, and recreational resources;
- protecting and restoring ecosystems from fires;
- developing incident management strategies and tactics;
- developing fire management plans;
- implementing prescribed fire or fire use plans;
- conducting field inspections before and after fires;
- planning and coordinating fire protection programs and fire responses with other Federal agencies, state and local agencies, and private commercial interests; and
- analyzing the ecological role of fires in fire protection programs.

Recreation management involves advising on, administering, supervising, or performing professional recreation work. Typical recreation management activities are:

- assessing the effect of recreation on wilderness, timber, range, soils, water, and wildlife;
- assessing recreational use compatibility with commercial activities, such as mining, surface mineral excavation, and grazing;
- balancing competing public and private goals for recreational development, commercial development, and natural resources preservation;
- planning and managing appropriate public access and facilities for recreation opportunities, while sustaining natural resources values;
- correcting damage caused by overused or unplanned recreation; and
- guiding public recreation users on natural resources values and responsibility for land stewardship.

Advisory Services – Both biological science and natural resources management functions may involve advising agency management, other scientists and professionals, and the public on natural resources matters.

INFORMATION BY SERIES IN NUMBER ORDER	
0401, General Natural Resources Management and Biological Sciences	<ul style="list-style-type: none"> • Series Definition • Titling • Occupational Information
0403, Microbiology	<ul style="list-style-type: none"> • Series Definition • Titling • Occupational Information
0405, Pharmacology	<ul style="list-style-type: none"> • Series Definition • Titling • Occupational Information
0408, Ecology	<ul style="list-style-type: none"> • Series Definition • Titling • Occupational Information
0410, Zoology	<ul style="list-style-type: none"> • Series Definition • Titling • Occupational Information
0413, Physiology	<ul style="list-style-type: none"> • Series Definition • Titling • Occupational Information
0414, Entomology	<ul style="list-style-type: none"> • Series Definition • Titling • Occupational Information
0415, Toxicology	<ul style="list-style-type: none"> • Series Definition • Titling • Occupational Information
0430, Botany	<ul style="list-style-type: none"> • Series Definition • Titling • Occupational Information
0434, Plant Pathology	<ul style="list-style-type: none"> • Series Definition • Titling • Occupational Information
0435, Plant Physiology	<ul style="list-style-type: none"> • Series Definition • Titling • Occupational Information
0437, Horticulture	<ul style="list-style-type: none"> • Series Definition • Titling • Occupational Information

0440, Genetics	<ul style="list-style-type: none"> • Series Definition • Titling • Occupational Information
0454, Rangeland Management	<ul style="list-style-type: none"> • Series Definition • Titling • Occupational Information
0457, Soil Conservation	<ul style="list-style-type: none"> • Series Definition • Titling • Occupational Information
0460, Forestry	<ul style="list-style-type: none"> • Series Definition • Titling • Occupational Information
0470, Soil Science	<ul style="list-style-type: none"> • Series Definition • Titling • Occupational Information
0471, Agronomy	<ul style="list-style-type: none"> • Series Definition • Titling • Occupational Information
0480, Fish and Wildlife Administration	<ul style="list-style-type: none"> • Series Definition • Titling • Occupational Information
0482, Fish Biology	<ul style="list-style-type: none"> • Series Definition • Titling • Occupational Information
0485, Wildlife Refuge Management	<ul style="list-style-type: none"> • Series Definition • Titling • Occupational Information
0486, Wildlife Biology	<ul style="list-style-type: none"> • Series Definition • Titling • Occupational Information
0487, Animal Science	<ul style="list-style-type: none"> • Series Definition • Titling • Occupational Information

OCCUPATIONAL INFORMATION BY SERIES

GENERAL NATURAL RESOURCES MANAGEMENT AND BIOLOGICAL SCIENCES, 0401		<u>Qualification Standards</u>
SERIES DEFINITION	<p>This series covers positions that manage, supervise, lead, or perform professional research, or scientific work in biology, agriculture, or natural resources management that is not classifiable to another more specific professional series in the Natural Resources Management and Biological Sciences Group, 0400.</p> <p>This series requires a <u>functional classification code</u>.</p>	
TITLING	<p>Agencies may use any basic position title that describes the work of the position. Agencies, however, may not use as a basic position title any title OPM has prescribed for another series.</p>	
OCCUPATIONAL INFORMATION	<p>This is a general series for the 0400 job family. Work within this series involves professional work in more than one series, or in the 0400 group not covered by a specific series.</p> <p><u>⇐BACK TO TABLE OF CONTENTS</u></p>	

MICROBIOLOGY, 0403		<u>Qualification Standards</u>
SERIES DEFINITION	<p>This series covers positions that manage, supervise, lead, or perform professional, research, or scientific work that involves studying the characteristics and life processes of microorganisms, their interrelationships with other living forms, and their reactions to the environment.</p> <p>This series requires a <u>functional classification code</u>.</p>	
TITLING	<p>The basic title for positions in this occupation is <i>Microbiologist</i>.</p>	
OCCUPATIONAL INFORMATION	<p>Microbiologists are involved in research and development work and regulatory and control work, and public health and medical laboratory testing. Work may involve producing antibiotics, sera, vaccines, and other biological products and testing food and dairy products.</p> <p>Research and development involves extending the microbiology body of knowledge. This work may entail microbiological, biochemical, biophysical, immunological, taxonomic, and other studies and tests of microbiological species or substances derived from microorganisms. Some research work is conducted in conjunction with medical laboratory or regulatory and control work.</p> <p>Regulatory and control work involves testing such items as food products, antibiotics, sera, and antitoxins for conformance to legal standards for purity, potency, and safety. The work also involves establishing such standards for inspecting facilities that produce biological products for conformance with approved methods and procedures.</p> <p>Public health and medical laboratory testing involves conducting tests to:</p> <ul style="list-style-type: none"> • determine serological and immunological reactions; • isolate and identify microorganisms from tissues, body fluids, excreta, or lesions; • assess antibiotic sensitivity; and • diagnose and control diseases caused by pathogenic microorganisms. <p>The microbiology series comprises specialties, such as mycology, bacteriology, and virology. Many assignments require generalists who can carry out a variety of laboratory procedures and adapt and apply the methodology of the science in a number of ways. This is particularly true of support scientists on teams that may conduct research and development activities or apply microbiology techniques.</p> <p><u>⇐BACK TO TABLE OF CONTENTS</u></p>	

PHARMACOLOGY, 0405		<u>Qualification Standards</u>
SERIES DEFINITION	<p>This series covers positions that manage, supervise, lead, or perform professional, research, or scientific work involving the action of drugs and therapeutic agents on living systems and their constituent parts. Covered positions do not require full professional training and experience in medicine or veterinary medicine.</p> <p>This series requires a <u>functional classification code</u>.</p>	
TITLING	<p>The basic title for positions in this occupation is <i>Pharmacologist</i>.</p>	
OCCUPATIONAL INFORMATION	<p>Pharmacologists conduct research to identify the short- and long-term effects of drugs and therapeutic chemicals. They also serve as consultants to other scientists, organizations, and interested parties on drug development, drug assessment, and the acute and chronic effects of drugs and chemicals present in products. The research pharmacologist seeks primarily knowledge of the toxic impact of a given substance, as well as:</p> <ul style="list-style-type: none"> • therapeutic use and range of dosage by various means of administration and known exposures; • the reversible or irreversible nature of the impact of the substances on particular organs, such as the liver or kidneys; and • the interaction of drugs and therapeutic agents with specific receptors in cells. <p>Pharmacologists develop or contribute to developing potent chemical agents, such as cardiac stimulants, antibiotics, and antidiabetic, antihypertensive, and anticancer drugs. Pharmacology includes the following specialties:</p> <ul style="list-style-type: none"> • Pharmacokinetics – focusing on drug absorption, distribution, bioaccumulation, biotransformation, and excretion; • Pharmacodynamics – focusing on drug biochemical and physiological effects, their mechanisms of action, and correlating drug actions with their chemical structures; and • Clinical Pharmacology – focusing on using drugs and therapeutic agents in humans and animals. <p>Consulting and advisory work involves activities, such as:</p> <ul style="list-style-type: none"> • monitoring, evaluating, and advising on existing and new antidotes, treatments, pretreatments, and prophylactic compounds for use against toxic agents; • assessing and advising on the risk of adverse health effects from the presence of hazardous substances and chemicals in consumer products; and • recommending pharmacological testing, changes in applicable regulations, and testing protocols and test programs to assess potentially hazardous products. <p><u>←BACK TO TABLE OF CONTENTS</u></p>	

ECOLOGY, 0408		<u>Qualification Standards</u>
SERIES DEFINITION	<p>This series covers positions that manage, supervise, lead, or perform professional, research, or scientific work involving the study of the relationships of organisms with each other, with their physical and chemical environments, and with society.</p> <p>This series requires a <u>functional classification code</u>.</p>	
TITLING	<p>The basic title for positions in this occupation is <i>Ecologist</i>.</p>	
OCCUPATIONAL INFORMATION	<p>Organisms live in a particular environment, such as a forest or a swamp. The physical parts of the environment that affect them define an ecosystem. Ecology is concerned with:</p> <ul style="list-style-type: none"> • the patterns of interactions between organisms and physical environment factors in ecosystems; • how various forms of life metabolize and obtain energy to survive; and • energy flows that may begin with producers, such as photosynthetic plants, transfer to primary consumers, herbivores, and to decomposing organisms that become a physical-chemical part of the ecosystem. <p>Ecologists may study the distribution and density of organisms that live in ecosystems. Studying changes in the distribution and density before and after specific human activities enables ecologists to model the ecosystem impacts of human activities. Factors in ecology studies include:</p> <ul style="list-style-type: none"> • quantitative attributes of population, such as population density, birth rate, spatial distribution, age structure, and resource demands; • the structure and interactions of populations of species in a community; • environment factors, such as tide pools, salt marshes, grasslands, deciduous forests, rangelands, deserts, vernal pools, and fens, and the interactions between them; • pesticide testing and control; • energy sources; and • air and water quality and flows in urban areas. <p>Ecologists provide advice on matters, such as:</p> <ul style="list-style-type: none"> • the effect of construction and land manipulation on wetlands, forests, rangelands, estuaries, riparian communities, and aquatic communities; • implementing legal standards and other requirements in the most ecologically sound manner; • compliance with natural resources management policies and practices; and • adjusting forest management procedures and range grazing practices to promote productivity and re-growth. <p><u>⇐BACK TO TABLE OF CONTENTS</u></p>	

ZOOLOGY, 0410		<u>Qualification Standards</u>
SERIES DEFINITION	<p>This series covers positions that manage, supervise, lead, or perform professional, research, or scientific work involving animal classification, structure, behavior, ecology, parasitological phenomena, evolution, and life history.</p> <p>This series requires a <u>functional classification code</u>.</p>	
TITLING	<p>The basic title for positions in this occupation is <i>Zoologist</i>.</p>	
OCCUPATIONAL INFORMATION	<p>Zoology involves studying or applying knowledge of animal life. Studies may involve the biology, life cycles, and habits of animals and the interactions of animals, plants, and parasites. Zoologists may work in the field and or in a laboratory. In the field, they observe the environment in which a species or group of species lives and they may acquire specimens. In the laboratory, zoologists may study, preserve, and dissect specimens, or study various aspects of animal and plant parasites. Work frequently requires a thorough knowledge of the biology of the plant or animal host and intermediate hosts. For example, before zoologists can resolve a problem of parasitology, they first develop a method of reproducing intermediate hosts in quantity in the laboratory.</p> <p>Most zoologists are involved in research, but some do clinical, regulatory, or other work.</p> <p><u>⇐BACK TO TABLE OF CONTENTS</u></p>	

PHYSIOLOGY, 0413		<u>Qualification Standards</u>
SERIES DEFINITION	<p>This series covers positions that manage, supervise, lead, or perform professional, research, or scientific work involving studies of the functions, environmental response, biological activities, and processes of humans and animals, and their component parts.</p> <p>This series requires a <u>functional classification code</u>.</p>	
TITLING	<p>The basic title for positions in this occupation is <i>Physiologist</i>.</p>	
OCCUPATIONAL INFORMATION	<p>Physiologists study and/or apply knowledge of life functions of humans and animals, both in the whole organism and at the cellular or molecular level under normal and abnormal conditions. Physiologists often specialize in such functions as:</p> <ul style="list-style-type: none"> • growth; • reproduction; • photosynthesis; • respiration; • movement; or • the physiology of a certain area or system of the organism. <p>They develop methods to measure and quantify functions at the organ, systemic, cellular, and molecular levels. To do so, they incorporate findings and techniques from biology, biophysics, chemistry, computer science, electronics, and physics.</p> <p>Not all physiologists are engaged in research. Some physiologists may apply knowledge of life functions to such activities as:</p> <ul style="list-style-type: none"> • managing human physical rehabilitation programs involving analyzing individual data, prescribing exercise, conducting exercise, and evaluating exercise programs to improve their quality; • analyzing injuries caused by consumer products to support voluntary and mandatory standards, performance criteria, design specifications, and quality controls; • performing health effects reviews; • evaluating new products and technological developments for compliance with pertinent regulations and laws, such as the Consumer Product Safety Act and the Federal Hazardous Substances Act; and • advising on agency policy guidelines and regulatory action. <p><u>⇐BACK TO TABLE OF CONTENTS</u></p>	

ENTOMOLOGY, 0414		<u>Qualification Standards</u>
SERIES DEFINITION	<p>This series covers positions that manage, supervise, lead, or perform professional, research, or scientific work in the field of entomology (insects).</p> <p>This series requires a <u>functional classification code</u>.</p>	
TITLING	<p>The basic title for positions in this occupation is <i>Entomologist</i>.</p>	
OCCUPATIONAL INFORMATION	<p>Entomology is the branch of science that works with insect:</p> <ul style="list-style-type: none"> • characteristics and life processes; • relationships with other insect species and other living forms; • reactions to and influence on the environment in which they are found; and • impact on human welfare. <p>The science of entomology is divided into two broad, but not mutually exclusive, categories:</p> <ul style="list-style-type: none"> • Research Entomology – involving expanding the body of knowledge about insect taxonomy, morphology, cytology, embryology, physiology, and genetics; and • Applied Entomology – involving the life history and habits of insects; methods for propagating beneficial insects; studying insects that transmit diseases or cause discomfort; and preventing, detecting, and suppressing outbreaks of noxious insects. Applied entomology is also concerned with protecting: <ul style="list-style-type: none"> – the economic, recreational, or natural values of public and private forest and rangelands; – manufacturers and consumers against insect infestation or contamination of stored foods or other products; – farmers, other producers, and consumers against insect damage or destruction to crops; – the public against importation or spread of insects that adversely affect human health or economic values; and – the physical welfare of military personnel, facilities, and inventories. <p>Applied entomologists typically perform the following functions:</p> <ul style="list-style-type: none"> • preventing insect infestations by analyzing the conditions in the physical environment and selecting, recommending, or applying procedures to prevent outbreaks; • detecting and evaluating insect infestations by inspecting the physical environment for evidence of significant increases in the insect population or conditions conducive to outbreaks; • determining the need for and feasibility of using parasites, predators, pathogens, or chemical, cultural, biological, or other artificial control measures; and • suppressing or controlling insect infestations through controls, such as insecticides, poisons, fumigants, heat, light, mechanical traps, quarantines, changes in agricultural or silvicultural practices, modifying drainage, sterilizing insects, or introducing parasites, predators, or pathogens. <p><u>⇐BACK TO TABLE OF CONTENTS</u></p>	

Toxicology, 0415		<u>Qualification Standards</u>
SERIES DEFINITION	<p>This series covers positions that manage, supervise, lead, or perform professional, research, or scientific work in the field of toxicology. Toxicology involves studying the adverse effects of chemical, biological and physical agents on humans, animals, and/or the ecosystems, the mechanisms by which foreign substances adversely affect health, and the toxic effects of exposure doses (including forensic measurements).</p> <p>This series requires a <u>functional classification code</u>.</p>	
TITLING	<p>The basic title for positions in this occupation is <i>Toxicologist</i>.</p>	
OCCUPATIONAL INFORMATION	<p>Toxicologists describe the safe use of chemicals and biological agents in terms of hazards, safety, and toxicity. The interrelated elements of toxicology include:</p> <ul style="list-style-type: none"> • a chemical, biological, or physical agent capable of producing a response; • an identifiable biological system with which an agent may interact to produce a response; • a response that can be considered deleterious to the biologic system; and • a means by which the agent and the biologic system are permitted to interact. <p>Toxicologists identify the relationships between exposure to chemical and biological agents and their effects on human and animal health and populations by:</p> <ul style="list-style-type: none"> • investigating the relationship of chemical and biological substances or similar agents with physical phenomena to determine their actual or potential injurious effects on organisms; • designing, developing, validating, and/or reviewing research protocols to evaluate compounds of poorly known or unknown characteristics; • evaluating probable adverse effects, including possible carcinogenic, mutagenic, teratogenic, or other effects, to estimate the relative hazard and environmental and probable metabolic fate of substances; and • developing and interpreting data, and evaluating chemicals and biological and physical agents for actual or potential human and animal health effects and environmental safety. <p>Toxicologists usually concentrate in one of the following areas:</p> <ul style="list-style-type: none"> • Laboratory Toxicology – the study of toxicity testing to yield information for evaluating risks to humans, animals, and/or environment by exposure to chemicals; • Research Toxicology – the study of the mechanisms by which chemicals exert their toxic effects on living organisms; or • Regulatory Toxicology – the study of drug and chemical risks related to establishing standards for the amount of chemicals permitted in ambient air, industrial atmospheres, drinking water, food, or feed. <p><u>←BACK TO TABLE OF CONTENTS</u></p>	

BOTANY, 0430		Qualification Standards
SERIES DEFINITION	<p>This series covers positions that manage, supervise, lead, or perform professional, research, or scientific work that involves the study of plant life. Work involves studying plant taxonomy, morphology, ecology, and ethnobotany.</p> <p>This series requires a functional classification code.</p>	
TITLING	<p>The basic title for positions in this occupation is <i>Botanist</i>.</p>	
OCCUPATIONAL INFORMATION	<p>Botany work ranges from studying the composition and arrangement of the structure of the deoxyribonucleic acid (DNA) molecule in the nucleus of a plant cell, to investigating and analyzing complex ecosystems and their effect on humans and the environment. Work includes studying the:</p> <ul style="list-style-type: none"> • chemical and physical natures of the materials and processes of plant cells; • organization of cells into tissues and tissues into organs; • history of plant life; • relationship of plants to all phases of their environment; and • industrial and agricultural applications of plants. <p>Traditionally, botany is divided into two main specialties:</p> <ul style="list-style-type: none"> • Plant Taxonomy – classifying members of the plant kingdom by name and description, and arranging them according to their natural relationships into species, genera, families, and orders; and • Plant Morphology – describing the form and structure of plants and tracing underlying similarities in form among various plant groups. <p>Plant morphology includes the study of:</p> <ul style="list-style-type: none"> • Anatomy – internal structures; • Cytology – cell structures; • Embryology – individual development; and • Morphogenesis – the factors determining form and structure. <p>Two other common botany specialties are plant ecology and plant geography. Plant ecology is concerned with the relationship between plants and environment, and structural and functional modifications resulting from changes in the environment. Plant geography is concerned with the geographical distribution of plants and the factors that determine this distribution.</p> <p>⇐BACK TO TABLE OF CONTENTS</p>	

PLANT PATHOLOGY, 0434		<u>Qualification Standards</u>
SERIES DEFINITION	<p>This series covers positions that manage, supervise, lead, or perform professional, research, or scientific work that involves the study, cause, nature, prevalence, severity, and control of plant diseases.</p> <p>This series requires a <u>functional classification code</u>.</p>	
TITLING	<p>The basic title for positions in this occupation is <i>Plant Pathologist</i>.</p>	
OCCUPATIONAL INFORMATION	<p>Plant pathology work involves:</p> <ul style="list-style-type: none"> • investigating the cause, nature, prevalence, and severity of parasitic, nonparasitic, and viral diseases attacking plants; • conducting experiments in, and establishing methods for, preventing and controlling plant diseases; or • studying relationships of plant diseases to practices involved in propagating, planting, cultivating, transporting, and storing plants and plant products. <p><u>←BACK TO TABLE OF CONTENTS</u></p>	

PLANT PHYSIOLOGY, 0435		<u>Qualification Standards</u>
SERIES DEFINITION	<p>This series covers positions that manage, supervise, lead, or perform professional, research, or scientific work that involves the study of plant growth, nutrition, respiration, and reproduction.</p> <p>This series requires a <u>functional classification code</u>.</p>	
TITLING	<p>The basic title for positions in this occupation is <i>Plant Physiologist</i>.</p>	
OCCUPATIONAL INFORMATION	<p>Plant physiology work involves studying the internal plant functions and processes, such as assimilation, photosynthesis, translocation, or transpiration and the influence of environmental factors, such as humidity, water, light, mineral nutrients, and temperature on these functions and processes.</p> <p><u>←BACK TO TABLE OF CONTENTS</u></p>	

HORTICULTURE, 0437		<u>Qualification Standards</u>
SERIES DEFINITION	<p>This series covers positions that manage, supervise, lead, or perform professional, research, or scientific work that involves the behavior, breeding, or culture of fruits, vegetables, flowers, or ornamental trees and shrubs, and allied problems of their production, storage, and handling.</p> <p>This series requires a <u>functional classification code</u>.</p>	
TITLING	<p>The basic title for this occupation is <i>Horticulturist</i>.</p>	
OCCUPATIONAL INFORMATION	<p>Horticulturists are involved in producing, using, and marketing commercial crops as well as landscape design, outdoor recreation, and floriculture. Work involves applying principles of plant science and technology to produce and use intensively cultivated crops, such as vegetables, fruits, flowers, ornamentals, turf grass, herbs, and medicinal plants. Horticultural crops have these features:</p> <ul style="list-style-type: none"> • consumed in fresh state; • highly perishable; • complex processing requirements; • plant diversity; • aesthetic value; and • sources of vitamins, fiber, minerals, and antioxidants for human disease prevention. <p>Some horticulturists conduct research involving:</p> <ul style="list-style-type: none"> • new control methods for insect pests of fruits, vegetables, and ornamentals; • basic physiological, biochemical, and pathological post-harvest problems of horticultural crops; • new citrus scion and rootstock varieties with enhanced tolerance to environmental stress, resistance to diseases and pests, and improved fruit quality and yield; • bacterial, fungal, nematode, and viral diseases of crops to improve crop production; and • impact of horticultural crop production on water quality. <p>Other horticulturists design, install, and maintain landscape to enhance environmental beauty, attract wildlife, and increase the quality of life. They also use plants to protect and conserve natural resources in rural and urban settings. Horticulturists may teach and provide service directly to the public.</p> <p><u>⇐BACK TO TABLE OF CONTENTS</u></p>	

GENETICS, 0440		<u>Qualification Standards</u>
SERIES DEFINITION	<p>This series covers positions that manage, supervise, lead, or perform professional, research, or scientific work involving the principles and mechanisms for transmitting and expressing human, animal, and plant characteristics by inheritance.</p> <p>This series requires a <u>functional classification code</u>.</p>	
TITLING	<p>The basic title for this occupation is <i>Geneticist</i>.</p>	
OCCUPATIONAL INFORMATION	<p>Genetics is the scientific study of the function and behavior of genes. Geneticists study genes and their relationship to the transmission and expression of plant and animal characteristics by inheritance.</p> <p>Geneticists seek to understand how cells use and control the information encoded in genes and transmit it from one generation to the next. They study how tiny variations in genes can disrupt an organism's development or cause disease.</p> <p>Genetic information is encoded in deoxyribonucleic acid (DNA). Geneticists have developed techniques to separate, rearrange, and transfer DNA from one cell to another. Some of these techniques help geneticists study the properties of genes in nature. They may compare DNA from different animals, for example, to find out whether they are closely related to each other or only distant relatives, or alter a plant or animal to make it more useful. They have, for example, altered:</p> <ul style="list-style-type: none"> • food crops, such as oranges, potatoes, wheat, and rice to withstand insect pests; • tomatoes and apples to resist discoloration or bruising; • cows to produce more milk; and • cows raised for beef to grow faster. <p>Many Government geneticists work to develop detailed maps of chromosomal locations of human and animal genes. They examine how gene activity can cause disease and develop new therapeutic agents and methods to prevent and treat specific disorders.</p> <p><u>⇐BACK TO TABLE OF CONTENTS</u></p>	

RANGELAND MANAGEMENT, 0454		<u>Qualification Standards</u>
SERIES DEFINITION	<p>This series covers positions that manage, supervise, lead, or perform professional or scientific work that involves conserving, developing, and managing rangelands. Rangelands are public or private lands on which the native plants are predominantly grasses, grass-like plants, herbs, or shrubs.</p> <p>This series requires a functional classification code.</p>	
TITLING	<p>The basic title for this occupation is <i>Rangeland Management Specialist</i>.</p>	
OCCUPATIONAL INFORMATION	<p>Rangeland management involves analyzing and protecting natural resources, developing programs and standards for rangeland use and preservation, and advising officials and landowners on rangeland management practices. Rangelands include grasslands, savannas, shrub lands, riparian properties, pastures, hay lands, deserts, tundra, alpine communities, coastal marshes, and wet meadows.</p> <p>Rangeland management has a large ecological component. Rangeland management specialists provide technical recommendations on managing public and private rangelands for ecological improvement consistent with objectives set forth in land use planning documents. They manage rangelands and their various resources to meet the present and future needs of the public. Resources include vegetation, soil, water, timber, minerals, wildlife habitats, historic and prehistoric resources, wilderness, scenery, open space, and a rural way of life. Use of rangelands include:</p> <ul style="list-style-type: none"> • livestock grazing, wildlife habitat, recreation, water, timber production, and mineral development; • producing forage for domestic and wild grazing animals, including wild horses and burros; • protecting threatened and endangered plant and wildlife species; and • various recreational activities. <p>Rangeland management specialists prepare both short- and long-range land use plans in consultation with Federal and non-Federal agencies and the public. The plans provide an in-depth analysis of the environmental, economic, and social effects of each proposed alternative action. Plans are subject to detailed scrutiny by Federal agencies and various public interests, including diverse interest groups that often have diametrically opposed goals and objectives. Other rangeland management specialist responsibilities include:</p> <ul style="list-style-type: none"> • developing conservation plans, designing technical surveys, and supervising construction; • developing contractual agreements between agencies and private landowners and/or contractors; • submitting reports to Congress; • protecting cultural resources; and • working with Federal, state, and local conservation agencies. <p>To carry out their responsibilities, rangeland management specialists apply knowledge of sciences, such as plant, animal, and soil sciences; watershed, habitat, and wildlife management; ecology; animal husbandry; economics; hydrology; agronomy; soil conservation and management; livestock management; recreation management; and forestry.</p> <p>←BACK TO TABLE OF CONTENTS</p>	

SOIL CONSERVATION, 0457		<u>Qualification Standards</u>
SERIES DEFINITION	<p>This series covers positions that manage, supervise, lead, or perform professional, research, or scientific work involving conserving soil, water, and related environmental resources to achieve sound land use.</p> <p>This series requires a <u>functional classification code</u>.</p>	
TITLING	<p>The basic title for this occupation is <i>Soil Conservationist</i>.</p>	
OCCUPATIONAL INFORMATION	<p>Soil and water conservation depend on a harmonious relationship between soil, water, plant, and animal resources. Soil conservation work involves:</p> <ul style="list-style-type: none"> • advising landowners about planned treatment of their property and how treatment can preserve, improve, and protect soil capabilities; • providing assistance to land users through a conservation or water oversight district: • planning terraces, ponds, and earthen dams; • selecting cropping methods to reduce erosion; • designing windbreaks for center pivot irrigation; • developing pasture and hay land conservation plans; • identifying flood plains and aquifers for local government units; • developing conservation measures to reduce pollutants reaching waterways; • persuading landowners to adopt conservation tillage cultivation methods that reduce soil loss, due to wind erosion and reduce energy costs; and • assisting landowners in managing habitats for a variety of wildlife including game, waterfowl, and fish, which also leads to conserving soil and enhancing water quality. <p>• Many soil conservationists directly advise and assist conservation organizations, private land owners, and conservation district members as they deliberate, discuss, plan, and carry out soil and water conservation policies, programs, and local activities.</p> <p><u>⇐BACK TO TABLE OF CONTENTS</u></p>	

FORESTRY, 0460		<u>Qualification Standards</u>
SERIES DEFINITION	<p>This series covers positions that manage, supervise, lead, or perform professional, research, or scientific work involving developing, producing, conserving, and utilizing the natural resources of forests and associated lands.</p> <p>This series requires a <u>functional classification code</u>.</p>	
TITLING	<p>The basic title for this occupation is <i>Forester</i>.</p>	
OCCUPATIONAL INFORMATION	<p>Forestry involves managing forestlands and grazing areas, timber production, soil conservation, preservation of wildlife habitats, watershed protection, and development of recreational opportunities. Foresters oversee, develop, and protect Federally-owned or managed forests and associated lands, including national forests, Indian reservations, military installations, and public domain lands. Work involves:</p> <ul style="list-style-type: none"> • inventorying, planning, evaluating, and managing forest resources, including timber, soil, land, water, wildlife and fish habitats, minerals, forage, and outdoor recreation; • protecting resources against fire, insects, disease, floods, and erosion; • evaluating, managing, and protecting forest lands and properties; • interpreting and communicating legislation about forest land management; • applying principles of sustained yield management to forest resources, wetlands, water and soil quality, and wildlife conservation, to protect forested lands during timber harvesting operations; and • developing new, improved, or more economic scientific methods, practices, or techniques necessary to perform such work. <p>Foresters also are concerned with:</p> <ul style="list-style-type: none"> • cooperating with and providing technical assistance to states, individual landowners, Indian tribal governing bodies, and organized groups; • conducting basic and applied research on managing timber, forest watersheds, and other related resources; • appraising forest lands, properties, and resources for acquisition, taxation, sale, exchange, or other purposes, including determining depreciation and depletion rates of forest resources; • evaluating policy issues and environmental regulations that affect many forestry-related activities; and • recommending policies and programs to keep the nation's forest lands, both public and private, fully productive for the purposes intended under enabling legislation. <p>Foresters prepare both short-and long-range land management and multi-resources plans to carry out their responsibilities. These plans provide alternative strategies and analyses of environmental, economic, and social effects of each alternative. Foresters prepare these plans in consultation with other Federal and non-Federal agencies and with the public.</p> <p><u>←BACK TO TABLE OF CONTENTS</u></p>	

SOIL SCIENCE, 0470		<u>Qualification Standards</u>
SERIES DEFINITION	<p>This series covers positions that manage, supervise, lead or perform professional, research, or scientific work that involves investigating soils, managing soil, adapting soils for alternative uses, and soil genesis, preservation, geography, classification, and morphology.</p> <p>This series requires a <u>functional classification code</u>.</p>	
TITLING	<p>The basic title for this position is <i>Soil Scientist</i>.</p>	
OCCUPATIONAL INFORMATION	<p>Soil science involves improving soil use, productivity, and management, and selecting soils for various uses. The science realizes these objectives by studying how geological, biological, hydrological, climatological, and physical science factors:</p> <ul style="list-style-type: none"> • interact to govern the uses to which the soil can be put; • modify and change the soil and its stability or capability; and • cause changes in soil characteristics. <p>Soil scientists apply the principles of sciences, such as physics, chemistry, biology, geology, climatology, mathematics, and physiography, and the concepts, principles, and techniques of soil science to do their work. They study the chemical, physical, biological, and mineralogical properties and processes of soils and their relationships to climatic, physiographic, and biologic influences as they relate to plant or crop growth. Also, they study responses of various soil types to fertilizers, tillage practices, and crop rotation to ensure environmental quality and effective land use.</p> <p>Soil scientists research, map, classify, and advise on soil productivity, quality, and suitability for use in public and private management, planning, and land use activities. They may also prepare, update, and deliver digital soil survey products; perform on-site detailed soil engineering tabulations; maintain soil information and interpretations; and perform detailed soil sampling for laboratory analysis and characterization.</p> <p>Soil scientists provide soil and rangeland management specialists, agronomists, geologists, foresters, and others with specialized information on soils and guidelines. They may consult with technical personnel working on construction projects to inform them about the effects of, and solutions to, soil problems. In addition, they work with the public, and with state and local government users of the soil information, such as community planners and tax assessors. Some soil scientists may specialize in one or both of the following functional areas based on the needs of the employing agency:</p> <ul style="list-style-type: none"> • the National Cooperative Soil Survey, which classifies and maps soils based on studying and measuring their significant characteristics, and explains the implications of soil data for farming, engineering, ranching, natural resources management, and other purposes; and/or • special purpose investigations of specific soil problems, planning for a specific soil use, or developing new soil management practices for particular soils in a problem area. <p><u>⇐BACK TO TABLE OF CONTENTS</u></p>	

AGRONOMY, 0471		<u>Qualification Standards</u>
SERIES DEFINITION	<p>This series covers positions that manage, supervise, lead, or perform professional, research, or scientific work that involves applying the fundamental principles of plant, soil, and related sciences to managing and improving crops and soils, producing field crops, and studying factors that influence crop growth.</p> <p>This series requires a <u>functional classification code</u>.</p>	
TITLING	<p>The basic title for positions in this occupation is <i>Agronomist</i>.</p>	
OCCUPATIONAL INFORMATION	<p>Agronomy involves applying plant and soil sciences to crop productivity and soil and water management. It has an important role in conservation and efficient use of natural resources, maintaining environmental quality, and sustained productivity of food, feed, fiber, and fuel. Work involves:</p> <ul style="list-style-type: none"> • determining the optimal amount, source, placement, form, and timing of the application of nutrients; and • managing pests, weeds, insects, diseases, animals, and other organisms that directly or indirectly cause crop damage. <p>Agronomists apply knowledge of biology, genetics, chemistry, and related sciences, engineering, and mathematical disciplines to do their work. They may specialize in research and/or field work.</p> <p><u>←BACK TO TABLE OF CONTENTS</u></p>	

FISH AND WILDLIFE ADMINISTRATION, 0480		<u>Qualification Standards</u>
SERIES DEFINITION	<p>This series covers positions that supervise, lead, or perform professional or scientific work that involves administering, directing, or exercising technical control over programs, regulatory activities, projects, and/or operations of fishery resources, fish and wildlife resources, and/or their habitats.</p> <p>This series requires a <u>functional classification code</u>.</p>	
TITLING	<p>The basic title for positions in this occupation is <i>Fish and Wildlife Administrator</i>.</p>	
OCCUPATIONAL INFORMATION	<p>Work involves conserving, enhancing, and protecting fish, wildlife, and plants, and their habitats. Responsibilities include advocacy and leadership in administering and managing fish and wildlife resources as required by legislation. Work involves activities, such as:</p> <ul style="list-style-type: none"> • directing and/or formulating policies, plans, standards, and procedures for comprehensive fish and wildlife conservation and restoration programs; • coordinating grants-in-aid for fish and wildlife programs; • establishing, maintaining, and nurturing relationships with non-agency partners, such as state agencies, conservation organizations, other Federal agencies, and fishing, hunting, boating industries; • negotiating with state fish and wildlife officials on activities allowable under Federal natural resources programs; • providing expertise to assure compliance with laws, regulations, policies, and Executive orders applicable to natural resources programs and activities; • interpreting and implementing legislation and legal decisions impacting natural resources practices and programs; • advising agency officials on complex scientific, political, and economic natural resources issues; and • auditing Federal grant programs to determine continuing fund eligibility. <p><u>←BACK TO TABLE OF CONTENTS</u></p>	

FISH BIOLOGY, 0482		<u>Qualification Standards</u>
SERIES DEFINITION	<p>This series covers positions that manage, supervise, lead, or perform professional, research, or scientific work that involves preserving, conserving, propagating, and managing fish and other aquatic species populations and their habitats for ecological purposes and to benefit the public.</p> <p>This series requires a <u>functional classification code</u>.</p>	
TITLING	<p>The basic title for positions in this occupation is <i>Fish Biologist</i>.</p>	
OCCUPATIONAL INFORMATION	<p>Fish biology involves work ranging from directly managing fish resources to studying and analyzing fish life history, behavior, habitat requirements, classification, and economic implications. Managing fish resources involves:</p> <ul style="list-style-type: none"> • assessing and mitigating environmental and human impacts on the survival and growth of aquatic species and their habitats; • operating physical plants, including sophisticated systems and equipment; • analyzing and planning physical facilities and methods to regulate resources for secure sustained optimum yields and species long-term survival and contribution to ecosystem functions; and • coordinating management programs with other natural resources activities, such as forest management, range management, and land use planning. <p>The fish biologist considers the conservation, culture, nutrition, fish health, and habitat restoration of fish and other aquatic species (crabs, shrimp, or oysters) in the context of their role in the ecosystems. Research work may involve studying various ecological systems in relation to the health, growth, and well-being of fish resources. Research work includes:</p> <ul style="list-style-type: none"> • conducting surveys, designing and implementing restoration plans, and developing recovery plans and other fish management plans; • preparing reports of results and findings; • identifying and protecting aquatic habitats and associated and interconnected uplands that contribute to stream and lake habitat quality; • developing and implementing techniques and methodologies for culturing fish (for example, hatchery operations), and dealing with fish health issues; • studying habitat requirements and the effects of environmental contaminants, parasites, and diseases on aquatic species; and/or • understanding and resolving issues related to introducing contaminants into the environment. <p><u>⇐BACK TO TABLE OF CONTENTS</u></p>	

WILDLIFE REFUGE MANAGEMENT, 0485		<u>Qualification Standards</u>
SERIES DEFINITION	<p>This series covers positions that manage, administer, supervise, lead, or scientifically operate Federally-owned or managed lands and waters designated as national wildlife refuges. Work involves establishing, conserving, protecting, restoring, and enhancing wildlife species and their required habitat, and/or conserving and managing fishery and wildlife resources.</p> <p>This series requires a <u>functional classification code</u>.</p>	
TITLING	<p>The basic titles for positions in this occupational series are:</p> <p><i>Wildlife Refuge Manager</i> – for work that involves managing, administering, and operating a national wildlife refuge.</p> <p><i>Wildlife Refuge Specialist</i> – for line or staff work that supports planning, administering, evaluating, managing, and/or operating programs, activities, and projects associated with conserving and managing fish and/or wildlife resources in national wildlife refuges.</p>	
OCCUPATIONAL INFORMATION	<p>Work involves developing, enhancing, protecting, and maintaining land and habitat for a variety of species within the confines of a national wildlife refuge system. The variety, depth, and difficulty of programs differ among refuges in terms of species involved, required protection, public use, commercial interests, water supply, and interests of other Federal agencies, and state and local governments. National wildlife refuges vary in size, topography, geographic location, climate and other characteristics. Physical characteristics include arctic tundra, desert, bog and marshlands, estuarine, coastline, wetlands, and uplands. Refuges may have sharply defined borders or be amorphous in shape. They may be pristine, or contain inhabited communities and historical landmarks. The work involves:</p> <ul style="list-style-type: none"> • planning land, water, and habitat management; • administering, supervising, and managing fish and wildlife public relations activities; • managing public, commercial, industrial, and agrarian land use; • preserving, restoring, and enhancing populations of endangered or threatened species of animals and plants; • perpetuating migratory and residential bird resources; • preserving a natural diversity and abundance of fauna and flora; • providing the public with an understanding and appreciation of fish and wildlife ecology; • providing the public with recreational opportunities, such as nature trails, hunting, fishing, and observation; • studying the characteristics and behavior of species; • evaluating the adequacy of habitats to support wildlife needs; • evaluating administration practices for one species relative to its impact on other species and their habitats; • identifying and applying disease control and containment methods; • ensuring that public uses are authorized, compatible with the purposes for which a refuge was established, and prevent adverse impact on wildlife species and national historic sites; 	

(continued)

WILDLIFE REFUGE MANAGEMENT, 0485 (continued)

OCCUPATIONAL INFORMATION (CONTINUED)

- contracting for business operations and issuing permits for economic uses of resources, such as farming, mineral exploration and extraction, and power production;
- reconciling biological program compatibility with other needs and activities in surrounding communities; and
- assessing the impact of agricultural and commercial activities or military operations on nearby managed property.

Administrative aspects of the work may require an understanding of the basic principles, concepts, and techniques of budgeting, contracting and procurement, personnel, records management, and property management.

[⇐BACK TO TABLE OF CONTENTS](#)

WILDLIFE BIOLOGY, 0486		<u>Qualification Standards</u>
SERIES DEFINITION	<p>This series covers positions that manage, supervise, lead, or perform professional, research, or scientific work that involves conserving, propagating, managing, protecting, and administering wildlife species.</p> <p>This series requires a <u>functional classification code</u>.</p>	
TITLING	<p>The basic title for positions in this occupation is <i>Wildlife Biologist</i>.</p>	
OCCUPATIONAL INFORMATION	<p>Wildlife biology involves dealing with the ecology, behavior, and conservation of wild animals and coordinating wildlife management programs with other natural resources activities, such as land use planning and forest and range management. Management work includes:</p> <ul style="list-style-type: none"> • developing and managing wildlife programs on Federally-owned or managed lands, such as national parks, national forests, wildlife refuges, Indian reservations, military installations, wetlands, big game and desert ranges, and other lands in the public domain; • developing and implementing cooperative programs with and providing technical assistance to states, private landowners, Alaskan Native and Indian tribal governing bodies, and special interest groups concerned with protection and proper management of wildlife and wildlife habitats; • assessing and conducting wildlife management transactions, such as acquiring, selling, leasing, or exchanging lands, easements, and other resources; • preparing, evaluating, and conducting biological analyses of land and water resources projects and Federal permit applications to ensure compliance with appropriate law and to mitigate adverse impacts on resources; and • reviewing state and Federal proposals for funding wildlife resources projects to determine if planned objectives warrant Federal funding and meet wildlife resources needs in accordance with applicable laws and regulations. <p>Research work involves proposing, designing, and conducting studies to determine:</p> <ul style="list-style-type: none"> • population status, trends, and problems of wildlife species; • disease control specifications; • endangered or threatened species protection and consultation requirements; • planned habitat management actions and evaluation procedures; • population enhancement programs; and • environmental contaminant specifications. <p><u>⇐BACK TO TABLE OF CONTENTS</u></p>	

ANIMAL SCIENCE, 0487		<u>Qualification Standards</u>
SERIES DEFINITION	<p>This series covers positions that manage, supervise, lead, or perform professional, research, or scientific work in the field of animal science. Work involves investigating, analyzing, and studying animal nutritional, biophysical, biochemical, and physiological relationships.</p> <p>This series requires a <u>functional classification code</u>.</p>	
TITLING	<p>The basic title for positions in this occupation is <i>Animal Scientist</i>.</p>	
OCCUPATIONAL INFORMATION	<p>Animal scientists apply knowledge of animal science, and biological, social, and physical sciences, mathematics, and statistics in their work.</p> <p>Most animal scientists are involved in investigative and research activities, but some positions involve other types of work, such as:</p> <ul style="list-style-type: none"> • managing herds or flocks in a productive operation; • breeding, developing, selecting, feeding, overseeing, and reproducing livestock, poultry, and similar animals; • caring for dairy animals, with specific concern for milk production and the various factors that influence milk production; and • breeding, developing, feeding, overseeing, and producing poultry and poultry products. <p>Animal scientists have a major role in research that may require specialized knowledge in:</p> <ul style="list-style-type: none"> • animal evaluation; • biochemistry; • biometry; • environmental science; • genetics; • immunology; • biological management; • meat science; • microbiology; • muscle biology; • pathology; and/or • physiology. <p>Some animal scientists inspect and grade livestock food products, purchase livestock, or work in technical sales or marketing. Other animal scientists advise agricultural producers on ways to upgrade animal housing facilities, lower mortality rates, handle waste matter, or increase production of animal products, such as milk and eggs.</p> <p><u>⇐BACK TO TABLE OF CONTENTS</u></p>	

DISTINGUISHING AMONG THE COVERED OCCUPATIONS

The occupations in this JFS cover a broad spectrum of functions that require extensive academic preparation not only in the biological sciences, but also in related physical sciences, mathematics, and statistics. The work of many of these occupations overlaps. As a result, the work in one occupation may define a part or phase of another. Consequently, distinctions between these series depend upon the:

- purpose of the work;
- background and qualifications of the incumbent;
- methodology or approach involved;
- career pattern; and
- requirements for applying the full range or portions of scientific knowledge.

IMPACT OF AUTOMATION

The information technology tools involved and the skill required to use them generally replace or supplement work previously done manually or by machines. Automation does not change the primary purpose of the work or the paramount knowledge required to do the work, which is a professional knowledge of natural resources management and biological sciences. Properly classifying positions in these occupations is based on the relevant knowledge and skills required to do the professional natural resources management and biological sciences duties of the position.

ADDITIONAL OCCUPATIONAL CONSIDERATIONS

Some positions may include professional work requiring knowledge and skills typically associated with the Natural Resources Management and Biological Sciences Group, 0400. In some cases, a closer look at the work may reveal that classification to a series in this job family may not be always be appropriate. [The General Series Determination Guidelines](#) section of this JFS offers guidance on selecting the most appropriate series.

The following table provides examples of work that is similar to that performed in the 400 job family, but not to the extent that the paramount knowledge required, the reason for the position's existence, the mission and/or function of the organization, and the recruitment source for the best qualified candidates would warrant classification to a series in this JFS.

If work involves...	and the paramount knowledge is...	see this standard or series definition:
planning human settlements	community planning concepts, principles, and practices, and the social, economic, political, and physical elements involved with them	0020, Community Planning
assessing the demand for and developing outdoor recreation	economics, sociology, and other social sciences and natural resources conservation sufficient to assess the demand for and develop outdoor recreation resources, but not requiring a foundation knowledge in the biological sciences, and not requiring knowledge to manage or administer wilderness, forest, grassland, and/or parkland recreation programs	0023, Outdoor Recreation Planning
developing and implementing environmental regulations, standards, and policies and securing compliance with them	environmental laws and regulations, but not requiring a foundation knowledge in the biological and agricultural sciences	0028, Environmental Protection Specialist
managing, directing, or assisting in managing or directing one or more programs	management and executive knowledge, but not requiring competence in the biological sciences	0340, Program Management
providing technical support to production, research operations, or program administration	methods and techniques of one or more of the biological or agricultural sciences acquired through practical experience and on-the-job training	0404, Biological Science Technician

(continued)

Additional Occupational Considerations (continued)

If work involves...	and the paramount knowledge is...	see this standard or series definition:
providing technical support to plant research; establishing and enforcing plant quarantines; and/or surveying, detecting, identifying, controlling, or eradicating plant pests	plant pests, quarantine procedures, pest control and eradication methods, and plant pest survey techniques acquired through practical experience and on-the-job training	<u>0421, Plant Protection Technician</u>
providing technical support to market range resources, and to manage, protect, and develop grasslands and other range resources	practical knowledge of methods and techniques of range conservation and related resource management fields acquired through practical experience and on-the-job training	<u>0455, Range Technician</u>
providing technical support and advising property holders on the effectiveness of soil and water conservation practices or assisting in research	methods and techniques of soil, water, and environmental conservation, as related to agricultural operations and land use, and acquired through practical experience and on-the-job training	<u>0458, Soil Conservation Technician</u>
distributing, controlling, and measuring irrigation water to operate irrigation systems	methods and procedures of irrigation system operation	<u>0459, Irrigation System Operation</u>
providing technical support to forestry research, marketing forest resources, and managing, protecting, and developing forest resources	practical methods and techniques of forestry and other biological resources management fields acquired through practical experience and on-the-job training	<u>0462, Forestry Technician</u>
providing diagnostic, preventive, or therapeutic services to patients and/or research and experimental work in the causes and prevention of disease	demonstrated by attaining a Doctor of Medicine or Doctor of Osteopathy degree	<u>0602, Medical Officer</u>
performing, or advising on, clinical laboratory testing of human blood, urine, and other body fluids or tissues, confirming test results, and developing data for physicians' use	medical technology, chemistry, biology, and other scientific disciplines related to clinical laboratory practice	<u>0644, Medical Technologist</u>

(continued)

Additional Occupational Considerations (continued)

If work involves...	and the paramount knowledge is...	see this standard or series definition:
compounding prescriptions; formulating, preparing, bulk compounding, selecting, dispensing, and preserving drugs, medicines, and chemicals; and/or evaluating drug proposals and advising on drug therapy and usage	demonstrated by a degree in pharmacy; solubility behavior of substances, stability of drugs, usages of drugs, and limitations on modes of administering drugs; and therapeutic, physical, and chemical incompatibilities in evaluating dosages, permissible concentrations of drugs, and undesirable chemical reactions	<u>0660, Pharmacist</u>
evaluating workplace conditions affecting the health and efficiency of employees or the public; eliminating or controlling occupational health hazards; and promoting occupational health programs and correcting potential health hazards	in scientific disciplines, such as physiology, chemistry, physics, engineering, medicine, and biochemistry, and a wide variety of industrial operations and processes, materials, equipment, and energy usage	<u>0690, Industrial Hygiene</u>
investigating, inspecting, and working with animal diseases, animal pollution, contamination of food of animal origin, the health and safety of imported animals and animal products, the efficacy of animal and human drugs and biological products, and conducting related enforcement activities	demonstrated by a degree in veterinary medicine or equivalent degree; and current and advanced or specialized veterinary medical arts and science principles and practices	<u>0701, Veterinary Medical Science</u>
inspecting, quarantining, identifying and collecting specimens; vaccinating or disposing of diseased animals; or disinfecting or controlling and eradicating infectious and communicable animal diseases	normal and certain abnormal animal health conditions and is acquired through practical experience and on-the-job training	<u>0704, Animal Health Technician</u>

(continued)

Additional Occupational Considerations (continued)

If work involves...	and the paramount knowledge is...	see this standard or series definition:
analyzing land characteristics, operational requirements, land use intensities, and commensurate land values; and efficient correlation of ground and water forms, plant forms, structures, roads, and walks to serve esthetic, functional, economic, and other interrelated purposes	professional landscape architectural planning and design; and allied physical planning fields of architecture, civil engineering, and the biological sciences as they affect land development	<u>0807, Landscape Architecture</u>
planning, designing, constructing, and/or maintaining structures and facilities that provide shelter, support transportation systems, and control natural resources	mechanics of solids and soils, hydraulics, theory of structure, strength of materials, engineering geology, and surveying	<u>0810, Civil Engineering</u>
facilities and systems for controlling pollution and protecting the quality of resources and the environment	principles, methods, and techniques of engineering concerned with facilities and systems for controlling pollution and protecting the quality of resources and the environment	<u>0819, Environmental Engineering</u>
researching, developing, designing, operating, evaluating, and improving chemical processes, plans, equipment, methods, or products	principles and practices of chemical engineering, chemistry, and other related scientific and engineering disciplines	<u>0893, Chemical Engineering</u>
studying matter, energy, physical space, time, the nature of physical measurement, fundamental structure particles, and the nature of the physical environment	demonstrated by a degree in a physical science field	<u>1300, Job Family Standard for Professional Work in the Physical Science Group</u>

CROSSWALK TO THE STANDARD OCCUPATIONAL CLASSIFICATION

The Office of Management and Budget requires that all Federal agencies that collect occupational data use the Standard Occupational Classification (SOC) system for statistical data reporting purposes. The Bureau of Labor Statistics uses SOC codes for the National Compensation Survey and other statistical reporting. OPM and other Federal agencies maintain a “crosswalk” between OPM authorized occupational series and the SOC codes to serve this need. This requirement and these SOC codes have no effect on the administration of any Federal human resources management system. The information in this table is for information only and has no direct impact on classifying positions covered by this job family standard. The SOC codes shown here generally apply only to nonsupervisory positions in these occupations. As changes occur to the SOC codes, OPM will update this table. More information about the SOC is available at <http://stats.bls.gov/soc>.

Federal Occupational Series and Position Titles and Their Related Standard Occupational Classification System Codes

Federal Occupational Series	Standard Occupational Classification Code Based on Occupational Series	Position Title	Standard Occupational Classification Code Based on Position Title
0401, General Natural Resources Management and Biological Sciences	19-1029	Biological Scientists, All Other	19-1029
0403, Microbiology	19-1022	Microbiologists	19-1022
0405, Pharmacology	19-1042	Medical Scientists, Except Epidemiologists	19-1042
0408, Ecology	19-1031	Conservation Scientists	19-1031
0410, Zoology	19-1023	Zoologists and Wildlife Biologists	19-1023
0413, Physiology	19-1099	Life Scientists, All Other	19-1099
0414, Entomology	19-1023	Zoologists and Wildlife Biologists	19-1023
0415, Toxicology	19-1042	Medical Scientists, Except Epidemiologists	19-1042
0430, Botany	19-1013	Soil and Plant Scientists	19-1013
0434, Plant Pathology	19-1013	Soil and Plant Scientists	19-1013
0435, Plant Physiology	19-1013	Soil and Plant Scientists	19-1013

(continued)

Federal Occupational Series and Position Titles and Their Related Standard Occupational Classification System Codes (continued)					
Federal Occupational Series	Standard Occupational Classification Code Based on Occupational Series		Position Title	Standard Occupational Classification Code Based on Position Title	
0437, Horticulture	19-1013	Soil and Plant Scientists	Horticulturist	19-1013	Soil and Plant Scientists
0440, Genetics	19-1029	Biological Scientists, All Other	Geneticist	19-1029	Biological Scientists, All Other
0454, Rangeland Management	19-1031	Conservation Scientists	Rangeland Management Specialist	19-1031	Conservation Scientists
0457, Soil Conservation	19-1031	Conservation Scientists	Soil Conservationist	19-1031	Conservation Scientists
0460, Forestry	19-1032	Foresters	Forester	19-1032	Foresters
0470, Soil Science	19-1013	Soil and Plant Scientists	Soil Scientist	19-1013	Soil and Plant Scientists
0471, Agronomy	19-1013	Soil and Plant Scientists	Agronomist	19-1013	Soil and Plant Scientists
0480, Fish and Wildlife Administration	19-1099	Life Scientists, All Other	Fish and Wildlife Administrator	19-1099	Life Scientists, All Other
0482, Fish Biology	19-1023	Zoologists and Wildlife Biologists	Fish Biologist	19-1023	Zoologists and Wildlife Biologists
0485, Wildlife Refuge Management	19-1099	Life Scientists, All Other	Wildlife Refuge Manager	19-1099	Life Scientists, All Other
			Wildlife Refuge Specialist	19-1099	Life Scientists, All Other
0486, Wildlife Biology	19-1023	Zoologists and Wildlife Biologists	Wildlife Biologist	19-1023	Zoologists and Wildlife Biologists
0487, Animal Science	19-1011	Animal Scientists	Animal Scientist	19-1011	Animal Scientists

PART II – GRADING INFORMATION

Part II provides grading information for use in determining the appropriate grade of nonsupervisory two-grade interval professional positions in the Natural Resources Management and Biological Sciences, Group, 0400. These grading criteria are applicable to General Schedule positions classified under chapter 51 of title 5, United States Code. They may also be used as appropriate to determine work levels for other Federal position classification systems. You will find more complete instructions for evaluating positions in the following OPM publications: [Introduction to the Position Classification Standards](#) and [The Classifier's Handbook](#).

HOW TO USE THIS GRADING INFORMATION

Evaluate positions on a factor by factor basis using the factor level descriptions (FLDs) provided in this standard. Compare each factor in the position description to the appropriate FLDs and illustrations. If the factor information in the position description fully matches an FLD for the series and specialty, you may assign the level without reviewing the illustrations. FLDs are progressive or cumulative in nature. For example, each FLD for Factor 1 – Knowledge Required by the Position encompasses the knowledge and skills identified at the previous level. Use only designated point values.

The FLDs in this standard cover nonsupervisory positions at grades GS-5 through GS-15. Evaluate supervisory, leader, test and evaluation, research grants, and research positions by applying the appropriate [functional guide](#).

Use the occupation- and specialty-specific [factor illustrations](#) following the FLDs as a frame of reference for applying factor level concepts. Do not rely solely on illustrations in evaluating positions, because they reflect a limited range of actual work examples. The level of work described in some illustrations may be higher than the threshold for a particular factor level. If the factor information in the position description fails to fully match a relevant illustration, but does fully match the FLD, you may still assign the level.

For each factor, record the factor level used, the points assigned, and relevant comments on the [Position Evaluation Summary Worksheet](#). Convert the total points to a grade using the Grade Conversion Table below, and record the grade in the Summary section of the Worksheet.

Grade Conversion Table

(The shaded portions of the table reflect the most commonly found grades in this job family)

Point Range	GS Grade
855-1100	5
1105-1350	6
1355-1600	7
1605-1850	8
1855-2100	9
2105-2350	10
2355-2750	11
2755-3150	12
3155-3600	13
3605-4050	14
4055-4480	15

POSITION EVALUATION SUMMARY WORKSHEET

Organization _____

Position # _____

Evaluation Factors	Factor Level Used (FL#, etc.)	Points Assigned	Comments
1. Knowledge Required by the Position			
2. Supervisory Controls			
3. Guidelines			
4. Complexity			
5. Scope and Effect			
6/7. Personal Contacts and Purpose of Contacts			
8. Physical Demands			
9. Work Environment			
S U M M A R Y	Total Points		
	Grade Conversion		

Additional Remarks:

Title, Series, and Grade Assigned:

Prepared by: _____

Date: _____

Agencies may copy for local use.

FACTOR LEVEL DESCRIPTIONS

FACTOR 1 – KNOWLEDGE REQUIRED BY THE POSITION

Factor 1 measures the nature and extent of information or facts that an employee must understand to do acceptable work (e.g., steps, procedures, practices, rules, policies, theories, principles, and concepts) and the nature and extent of the skills necessary to apply that knowledge. You should only select a factor level under this factor when the knowledge described is required and applied.

NOTE: All factor level descriptions (FLDs) apply to all 0400P occupational series in this JFS.

Level 1-5		750 Points																																																
SERIES	<table style="width: 100%; border: none;"> <tr> <td style="width: 40%;">General Natural Resources Management and Biological Sciences</td> <td style="width: 10%; text-align: right;">0401</td> <td style="width: 40%;">Genetics</td> <td style="width: 10%; text-align: right;">0440</td> </tr> <tr> <td style="padding-left: 20px;">Microbiology</td> <td style="text-align: right;">0403</td> <td style="padding-left: 20px;">Rangeland Management</td> <td style="text-align: right;">0454</td> </tr> <tr> <td style="padding-left: 20px;">Pharmacology</td> <td style="text-align: right;">0405</td> <td style="padding-left: 20px;">Soil Conservation</td> <td style="text-align: right;">0457</td> </tr> <tr> <td style="padding-left: 40px;">Ecology</td> <td style="text-align: right;">0408</td> <td style="padding-left: 40px;">Forestry</td> <td style="text-align: right;">0460</td> </tr> <tr> <td style="padding-left: 40px;">Zoology</td> <td style="text-align: right;">0410</td> <td style="padding-left: 40px;">Soil Science</td> <td style="text-align: right;">0470</td> </tr> <tr> <td style="padding-left: 40px;">Physiology</td> <td style="text-align: right;">0413</td> <td style="padding-left: 40px;">Agronomy</td> <td style="text-align: right;">0471</td> </tr> <tr> <td style="padding-left: 20px;">Entomology</td> <td style="text-align: right;">0414</td> <td style="padding-left: 20px;">Fish and Wildlife Administration</td> <td style="text-align: right;">0480</td> </tr> <tr> <td style="padding-left: 40px;">Toxicology</td> <td style="text-align: right;">0415</td> <td style="padding-left: 40px;">Fish Biology</td> <td style="text-align: right;">0482</td> </tr> <tr> <td style="padding-left: 40px;">Botany</td> <td style="text-align: right;">0430</td> <td style="padding-left: 40px;">Wildlife Refuge Management</td> <td style="text-align: right;">0485</td> </tr> <tr> <td style="padding-left: 20px;">Plant Pathology</td> <td style="text-align: right;">0434</td> <td style="padding-left: 20px;">Wildlife Biology</td> <td style="text-align: right;">0486</td> </tr> <tr> <td style="padding-left: 20px;">Plant Physiology</td> <td style="text-align: right;">0435</td> <td style="padding-left: 20px;">Animal Science</td> <td style="text-align: right;">0487</td> </tr> <tr> <td style="padding-left: 40px;">Horticulture</td> <td style="text-align: right;">0437</td> <td></td> <td></td> </tr> </table>	General Natural Resources Management and Biological Sciences	0401	Genetics	0440	Microbiology	0403	Rangeland Management	0454	Pharmacology	0405	Soil Conservation	0457	Ecology	0408	Forestry	0460	Zoology	0410	Soil Science	0470	Physiology	0413	Agronomy	0471	Entomology	0414	Fish and Wildlife Administration	0480	Toxicology	0415	Fish Biology	0482	Botany	0430	Wildlife Refuge Management	0485	Plant Pathology	0434	Wildlife Biology	0486	Plant Physiology	0435	Animal Science	0487	Horticulture	0437			
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Horticulture	0437																																																	
FLD	<p>Knowledge of, and skill in applying basic concepts, principles, and methodologies of the field sufficient to:</p> <ul style="list-style-type: none"> • perform conventional scientific or natural resources management tasks that have well-established boundaries or expectations; and • complete developmental assignments that expand the employee’s understanding of concepts and underlying principles; and/or program requirements and procedures. 																																																	

Level 1-6		950 Points	
SERIES	General Natural Resources Management and Biological Sciences	0401	Genetics 0440
	Microbiology	0403	Rangeland Management 0454
	Pharmacology	0405	Soil Conservation 0457
	Ecology	0408	Forestry 0460
	Zoology	0410	Soil Science 0470
	Physiology	0413	Agronomy 0471
	Entomology	0414	Fish and Wildlife Administration 0480
	Toxicology	0415	Fish Biology 0482
	Botany	0430	Wildlife Refuge Management 0485
	Plant Pathology	0434	Wildlife Biology 0486
	Plant Physiology	0435	Animal Science 0487
	Horticulture	0437	
FLD	Knowledge of and skill in applying:		
	<ul style="list-style-type: none"> • concepts, principles, practices, and methodology of the field; • the organization’s programs and their governing laws and regulations; • related mathematical and/or biological disciplines; and • Federal, state, local, and/or tribal laws and regulations; 		
	and/or:		
	<ul style="list-style-type: none"> • recognized reference standards; • medical and legal requirements; and • regulatory agency requirements 		
	sufficient to:		
<ul style="list-style-type: none"> • independently perform recurring, well-precedented projects using standard methods and techniques; • identify and resolve problems; • provide technical advice to laymen; • evaluate requests for access and use of public lands; and • prepare routine reports and make presentations; 			
and/or to:			
<ul style="list-style-type: none"> • set up and implement new procedures; • establish quality controls; • ensure proper collection and preservation of specimens; • perform and monitor the full range of specialized tests and non-routine procedures for which there are standard methods and techniques; • calculate and correlate test results; and • verify results. 			

Level 1-7		1250 Points		
SERIES	General Natural Resources Management and Biological Sciences	0401	Genetics 0440	
	Microbiology	0403	Rangeland Management 0454 <u>Illustration(s)</u>	
	Pharmacology	0405	Soil Conservation 0457	
	Ecology	0408 <u>Illustration(s)</u>	Forestry 0460 <u>Illustration(s)</u>	
	Zoology	0410	Soil Science 0470 <u>Illustration(s)</u>	
	Physiology	0413	Agronomy 0471	
	Entomology	0414 <u>Illustration(s)</u>	Fish and Wildlife Administration 0480	
	Toxicology	0415	Fish Biology 0482 <u>Illustration(s)</u>	
	Botany	0430	Wildlife Refuge Management 0485 <u>Illustration(s)</u>	
	Plant Pathology	0434	Wildlife Biology 0486 <u>Illustration(s)</u>	
	Plant Physiology	0435	Animal Science 0487	
	Horticulture	0437		
	FLD	Knowledge of and skill in applying:		
		<ul style="list-style-type: none"> • a wide range of concepts, principles, practices, and methodology of the field; • agency regulations, policies, and procedures; • applicable Federal statutes and legislation governing individual programs; • related disciplines; and • state, local, and/or tribal laws, customs, mores, and economic interests 		
		sufficient to:		
	<ul style="list-style-type: none"> • resolve complex problems involving matters, such as developing and implementing multiple-use resource management plans or covering diverse resource management issues; • modify or adapt standard processes and procedures; • assess, select, and apply remedies suited to the assigned problem or situation; • devise strategies to overcome significant resource or environmental problems; • assess the environmental impact of various practices; • recommend and justify appropriate resource management strategies; • apply environmental regulatory requirements in resource management reviews and contract proposals; • provide advisory and/or specialized services; and • evaluate the economic impact of exploiting natural resources; 			
	and/or to:			
<ul style="list-style-type: none"> • perform complex tests and/or procedures that require using highly specialized methods or techniques; • recognize and identify unusual and diverse entities, occurrences, or investigative outcomes relevant to the program area; • modify or adapt established protocols and procedures in response to test or study findings; • plan studies that require making significant departures from previous approaches; • revise standard methods to improve or extend test and study systems; and • prepare and present scientific and technical reports. 				

LEVEL 1-8		1550 POINTS		
SERIES	General Natural Resources Management and Biological Sciences	0401	Genetics 0440	
	Microbiology	0403	Rangeland Management 0454 <u>Illustration(s)</u>	
	Pharmacology	0405	Soil Conservation 0457 <u>Illustration(s)</u>	
	Ecology	0408 <u>Illustration(s)</u>	Forestry 0460	
	Zoology	0410	Soil Science 0470 <u>Illustration(s)</u>	
	Physiology	0413	Agronomy 0471	
	Entomology	0414	Fish and Wildlife Administration 0480	
	Toxicology	0415	Fish Biology 0482 <u>Illustration(s)</u>	
	Botany	0430	Wildlife Refuge Management 0485 <u>Illustration(s)</u>	
	Plant Pathology	0434	Wildlife Biology 0486	
	Plant Physiology	0435	Animal Science 0487	
	Horticulture	0437		
	FLD	<p>Mastery of, and skill in applying, advanced theories, principles, concepts, practices, standards, and methods of the field sufficient to:</p> <ul style="list-style-type: none"> • design projects that represent a major segment of the agency’s operating programs; • perform assignments that involve initiating, formulating, and planning, as well as executing major studies, or continuing specialized projects; • use findings of specialized studies, new analytical developments, and modified processes to resolve novel, obscure, or highly controversial problems that affect the program area; • provide significant and innovative recommendations for advancing programs and/or methods; and • serve as a recognized authority in a specialized area or program. 		

LEVEL 1-9		1850 POINTS		
SERIES	General Natural Resources Management and Biological Sciences	0401	Genetics 0440	
	Microbiology	0403	Rangeland Management 0454 <u>Illustration(s)</u>	
	Pharmacology	0405	Soil Conservation 0457	
	Ecology	0408	Forestry 0460	
	Zoology	0410	Soil Science 0470	
	Physiology	0413 <u>Illustration(s)</u>	Agronomy 0471	
	Entomology	0414	Fish and Wildlife Administration 0480	
	Toxicology	0415	Fish Biology 0482	
	Botany	0430	Wildlife Refuge Management 0485 <u>Illustration(s)</u>	
	Plant Pathology	0434	Wildlife Biology 0486	
	Plant Physiology	0435	Animal Science 0487	
	Horticulture	0437		
	FLD	Mastery of, and skill in applying, the theories, principles, and concepts of the field sufficient to:		
		<ul style="list-style-type: none"> • develop new theories, concepts, principles, standards, and methods; • plan and execute long-range programs and projects of national significance; • serve as a recognized expert and consultant in a broad range of subject-matter programs that impact a number of resources; and • advance the state-of-the-art beyond current discipline parameters. 		

FACTOR 2 – SUPERVISORY CONTROLS

This factor covers the nature and extent of direct or indirect controls exercised by the supervisor, or a designated individual, over the work performed, the employee's responsibility, and review of completed work. The controls apply to both how supervisors assign and review work. The supervisor determines what information the employee needs to perform the assignments (e.g., instructions, priorities, deadlines, objectives, and boundaries). Review controls may range from detailed inspection of work in progress, to simply confirming that the work adheres to agency policy. The employee's responsibilities complement the supervisory controls (e.g., if the supervisor does not establish the sequence in which the work is to be done, it becomes an employee responsibility). The primary components of this factor are presented below in three categories: **How Work Is Assigned, Employee Responsibility, and How Work Is Reviewed.**

NOTE: All factor level descriptions (FLDs) apply to all 0400P occupational series in this JFS.

LEVEL 2-1	25 POINTS
<p>How Work Is Assigned – The supervisor or designated employee provides assignments consisting of:</p> <ul style="list-style-type: none"> • routine requirements; • developmental tasks to prepare the employee for higher level work; • detailed instructions on how to use and select specific methods, procedures, and techniques; and • deadlines and priorities. <p>Employee Responsibility – The employee:</p> <ul style="list-style-type: none"> • performs work as instructed; • consults with the supervisor or designated employee when clarification of instructions is necessary; and • receives guidance on problems and work methods not specifically covered by the original instructions. <p>How Work Is Reviewed – The supervisor or designated employee evaluates all work in progress and results for accuracy.</p>	

LEVEL 2-2	125 POINTS
<p>How Work Is Assigned – The supervisor or designated employee instructs the employee on the assignment's objectives, scope, limitations, expected deadlines, and priorities. The supervisor provides specific instructions on new assignments.</p> <p>Employee Responsibility – The employee:</p> <ul style="list-style-type: none"> • works independently, but within the framework the supervisor established and in conformance with established practices and prescribed procedures; and • refers problems not covered by instructions or guides to the supervisor for help or a decision. <p>How Work Is Reviewed – The supervisor or designated employee:</p> <ul style="list-style-type: none"> • reviews completed work closely to verify accuracy and conformance to required procedures and any special instructions; • reviews findings and conclusions to ensure they are supported by facts; and • typically reviews in detail the more difficult work of a type the employee has not previously done. 	

LEVEL 2-3**275 POINTS**

How Work Is Assigned – The supervisor or designated employee outlines or discusses possible problem areas and defines objectives, plans, priorities, and deadlines. Assignments have clear precedents requiring successive steps in planning and execution.

Employee Responsibility – The employee:

- independently plans and carries out the assignments in conformance with accepted policies and practices;
- adheres to instructions, policies, and guidelines to resolve commonly encountered work problems and deviations; and
- brings controversial information or findings to the supervisor's attention for direction.

How Work Is Reviewed – The supervisor or designated employee:

- provides assistance on controversial or unusual situations that do not have clear precedents;
- reviews completed work for conformity with policy, the effectiveness of the employee's approach to the problem, technical soundness, adherence to deadlines, accomplishment of objectives; and
- performs a limited review of the methods used to complete the assignment.

LEVEL 2-4**450 POINTS**

How Work Is Assigned – The supervisor outlines overall objectives and available resources. The employee and supervisor, in consultation, discuss timeframes and scope of the assignment including possible stages and approaches.

Employee Responsibility – The employee:

- plans and carries out the assignment;
- resolves most conflicts that arise;
- coordinates work with others as necessary;
- interprets policy and regulatory requirements;
- keeps the supervisor informed of progress and potentially controversial problems, concerns, issues, or other matters;
- develops changes to plans and/or methodology; and
- recommends improvements to meet program objectives.

How Work Is Reviewed – The supervisor reviews completed work for soundness of overall approach, effectiveness in meeting requirements or producing expected results, the feasibility of recommendations, and adherence to requirements. The supervisor usually does not review methods used.

LEVEL 2-5**650 POINTS**

How Work Is Assigned – The supervisor provides administrative and policy direction in terms of broadly defined missions or functions of the agency.

Employee Responsibility – The employee:

- defines objectives;
- interprets policies promulgated by authorities senior to the immediate supervisor and determines their effect on program needs;
- independently plans, designs, and carries out the work to be done; and
- serves as a technical authority.

How Work Is Reviewed – The supervisor:

- reviews work for potential impact on broad agency policy objectives and program goals;
- normally accepts work as being technically authoritative; and
- normally accepts work without significant change.

FACTOR 3 – GUIDELINES

This factor covers the nature of guidelines and the judgment employees need to apply them. The availability of specific, applicable guidelines may vary with individual assignments; thus, the judgment employees use similarly varies with the assignment. The existence of detailed plans and other instructions may make innovation in planning and conducting work unnecessary or undesirable. However, in the absence of guidance provided by prior agency experience with the task at hand or when objectives are broadly stated, the employee may use considerable judgment in developing an approach or planning the work. The following are examples of guidelines used in professional and scientific work in the Natural Resources Management and Biological Sciences Group, 0400:

- Federal, state, tribal, county, and local government statutes, regulations, ordinances, and codes;
- employing agency policies, program manuals, management plans, practices, and procedures;
- other agencies' policies, regulations, and procedures;
- foreign laws, treaties, and regulations;
- court decisions and precedents;
- textbooks and professional and scientific journals; and
- research and technical reports.

Do not confuse guidelines with the knowledge described under Factor 1 – Knowledge Required by the Position. The primary components of this factor are: **Guidelines Used** and **Judgment Needed**.

NOTE: All factor level descriptions (FLDs) apply to all 0400P occupational series in this JFS

LEVEL 3-2	125 POINTS
<p>Guidelines Used – The employee uses a number of guidelines that are directly applicable to the assignment. Guidelines prescribe established procedures and techniques and provide clear precedents.</p> <p>Judgment Needed – The employee:</p> <ul style="list-style-type: none"> • uses judgment in selecting and applying the most appropriate guidelines; • determines the appropriateness and applicability of any minor deviations within existing guidelines; and • refers to the supervisor situations to which the existing guidelines cannot be applied or require significant deviations. 	

LEVEL 3-3**275 POINTS**

Guidelines Used – The employee uses a wide variety of reference materials and manuals; however, they are not always directly applicable to the work or have gaps in specificity. Available precedents outline existing approaches to more general problems or issues.

Judgment Needed – The employee uses judgment in selecting, interpreting, and applying available guidelines for adaptation to specific problems or issues.

LEVEL 3-4**450 POINTS**

Guidelines Used – The employee uses guidelines and precedents that are very general regarding agency policy statements and objectives. Guidelines specific to assignments are often scarce, not applicable, or have gaps in specificity that require considerable interpretation and/or adaptation for application to issues and problems.

Judgment Needed – The employee uses judgment, initiative, and resourcefulness in deviating from established methods to:

- deal with specific issues or problems;
- research trends and patterns;
- propose new policies and practices;
- develop new methods and criteria; and/or
- modify, adapt, and/or refine broader guidelines to resolve specific complex and/or intricate issues and problems.

LEVEL 3-5**650 POINTS**

Guidelines Used – The employee uses guidelines, such as broad policy statements, basic legislation, recent scientific findings, or reports that are often ambiguous and require extensive interpretation.

Judgment Needed – The employee uses judgment and ingenuity and exercises broad latitude to:

- determine the intent of applicable guidelines;
- develop policy and guidelines for specific areas of work; and
- formulate interpretations that may take the form of policy statements, regulations, and guidelines.

FACTOR 4 – COMPLEXITY

This factor covers the nature, number, variety, and intricacies of tasks, steps, processes, or methods in the work performed; the difficulty in identifying what needs to be done; and the difficulty and originality involved in performing the work. The primary components of this factor are: **Nature of Assignment, What Needs To Be Done, and Difficulty and Originality Involved in Doing the Work.**

NOTE: All factor level descriptions (FLDs) apply to all 0400P occupational series in this JFS.

LEVEL 4-2		75 POINTS				
SERIES	General Natural Resources Management and Biological Sciences	0401	Genetics	0440		
	Microbiology	0403	Rangeland Management	0454	<u>Illustration(s)</u>	
	Pharmacology	0405	Soil Conservation	0457		
	Ecology	0408	Forestry	0460		
	Zoology	0410	Soil Science	0470		
	Physiology	0413	Agronomy	0471		
	Entomology	0414	Fish and Wildlife Administration	0480		
	Toxicology	0415	Fish Biology	0482		
	Botany	0430	Wildlife Refuge Management	0485		
	Plant Pathology	0434	Wildlife Biology	0486		
	Plant Physiology	0435	Animal Science	0487		
	Horticulture	0437				
	FLD	<p>Nature of Assignment – Work involves performing specific related tasks that provide experience in the steps, processes, methods, or procedures, and in applying basic principles, theories, and practices of the field. Assignments consist of routine, individualized tasks, or limited phases of broader assignments. Tasks may involve:</p> <ul style="list-style-type: none"> • observing readily identifiable phenomena; • collecting and recording data; • reporting observations; and • detecting discrepancies in results and identifying deviations. 				
		<p>What Needs To Be Done – To decide what needs to be done, the employee recognizes differences among a few easily distinguishable situations and then chooses a course of action from various standard steps, processes, methods, and procedures of the field.</p>				
		<p>Difficulty and Originality Involved in Doing the Work – The employee makes factual distinctions within established parameters.</p>				

LEVEL 4-3		150 POINTS		
SERIES	General Natural Resources Management and Biological Sciences	0401	Genetics 0440	
	Microbiology	0403	Illustration(s)	
	Pharmacology	0405	Rangeland Management 0454	
	Ecology	0408	Soil Conservation 0457	
	Zoology	0410	Forestry 0460	
	Physiology	0413	Soil Science 0470	
	Entomology	0414	Illustration(s)	
	Toxicology	0415	Agronomy 0471	
	Botany	0430	Fish and Wildlife Administration 0480	
	Plant Pathology	0434	Fish Biology 0482	
	Plant Physiology	0435	Wildlife Refuge Management 0485	
	Horticulture	0437	Wildlife Biology 0486	
			Animal Science 0487	
	<p>Nature of Assignment – Work involves performing research, testing, or natural resources management functions and duties that require unrelated steps, processes, methods, or procedures. Tasks may include:</p> <ul style="list-style-type: none"> analyzing and evaluating diverse environmental conditions and proposed natural resources management actions changing habitat conditions; and/or inspecting activities for conformance with standards and compliance with regulatory requirements; <p>and/or:</p> <ul style="list-style-type: none"> applying well established breeding methods and concepts; conducting soil surveys; and compiling special farm planning maps. 			
	<p>What Needs To Be Done – To decide what needs to be done, the employee analyzes, evaluates, and selects an appropriate course of action from many known alternatives that concern, impact, or involve:</p> <ul style="list-style-type: none"> the condition of the environment; the value of various practices; compliance with legally mandated actions and conditions; risk to the environment and to the local economy; proposed sites for revegetation, reforestation, roads, and other uses; and commercial or recreational use of natural resources; <p>and/or:</p> <ul style="list-style-type: none"> biological or other scientific properties of substances or items; test instrument performance; acceptability of control samples; special sterilization procedures; and assessing the effectiveness of known control measures. 			
	<p>Difficulty and Originality Involved in Doing the Work – The employee identifies, interprets, analyzes, and applies a range of established approaches and solutions to tests, problems, or issues.</p>			
	FLD			

LEVEL 4-4		225 POINTS		
SERIES	General Natural Resources Management and Biological Sciences	0401	Genetics 0440	
	Microbiology	0403	Rangeland Management 0454 Illustration(s)	
	Pharmacology	0405	Soil Conservation 0457	
	Ecology	0408	Forestry 0460	
	Zoology	0410	Soil Science 0470 Illustration(s)	
	Physiology	0413	Agronomy 0471	
	Entomology	0414	Fish and Wildlife Administration 0480	
	Toxicology	0415	Fish Biology 0482	
	Botany	0430	Wildlife Refuge Management 0485	
	Plant Pathology	0434	Wildlife Biology 0486	
	Plant Physiology	0435	Animal Science 0487	
	Horticulture	0437		
	FLD	<p>Nature of Assignment – Work involves performing a variety of research, testing, or natural resources management duties that require many different and unrelated processes, methods, and problem solving techniques common to the discipline. Problems may involve interdependent resource and socioeconomic issues relevant to an area of specialization and/or:</p> <ul style="list-style-type: none"> relating new work situations to precedent situations; conducting investigations and special survey procedures; and extending, adapting, or modifying existing techniques. 		
		<p>What Needs To Be Done – To decide what needs to be done, the employee:</p> <ul style="list-style-type: none"> conducts special studies; evaluates unusual circumstances; works with incomplete and conflicting data; reconciles environmental goals that have conflicting requirements; contends with the absence of criteria; and contends with new methods and equipment. 		
		<p>Difficulty and Originality Involved in Doing the Work – The employee uses considerable judgment to:</p> <ul style="list-style-type: none"> plan the sequence, direction, and progress of work; interpret voluminous data or data that are incomplete or conflicting, or of questionable accuracy; modify standard methods, practices, or techniques or existing guides to address current and evolving problems or issues; identify, evaluate, and project risks based on scarce, non-existent, or conflicting data; and assess the interrelationships of physiological and technological information. 		

LEVEL 4-5		325 POINTS		
SERIES	General Natural Resources Management and Biological Sciences	0401	Genetics 0440	
	Microbiology	0403	Rangeland Management 0454 <u>Illustration(s)</u>	
	Pharmacology	0405	Soil Conservation 0457	
	Ecology	0408	Forestry 0460	
	Zoology	0410	Soil Science 0470	
	Physiology	0413	Agronomy 0471	
	Entomology	0414	Fish and Wildlife Administration 0480	
	Toxicology	0415 <u>Illustration(s)</u>	Fish Biology 0482 <u>Illustration(s)</u>	
	Botany	0430	Wildlife Refuge Management 0485 <u>Illustration(s)</u>	
	Plant Pathology	0434	Wildlife Biology 0486	
	Plant Physiology	0435	Animal Science 0487	
	Horticulture	0437		
	<p>Nature of Assignment – Work involves performing a variety of research, testing, or natural resources management duties requiring:</p> <ul style="list-style-type: none"> • in-depth analysis of problems and issues that cover a wide geographic area or an environmentally varied area; • integrated resource analysis and coordinating and planning activities that cover multiple resource programs; and • developing new methods and techniques for problem and issue resolution; <p>and/or in-depth analysis and use of various control methods and techniques possibly including those in the experimental stage.</p> <p>What Needs To Be Done – To decide what needs to be done, the employee analyzes issues involving:</p> <ul style="list-style-type: none"> • abstract concepts; • major uncertainties with regard to the most effective approach or methodology to apply; • serious conflicts among scientific requirements and environmental program direction or administrative and legal requirements; • continually changing program or work requirements or technological developments; • novel and obscure problems involving complicating factors and requirements; and • intricate, inconclusive, variable data, and unrelated or conflicting data. <p>Difficulty and Originality Involved in Doing the Work – The employee:</p> <ul style="list-style-type: none"> • develops standards, methods, and techniques to extend existing methodological capability; • proposes solutions that have highly visible political consequences; • formulates solutions to unyielding or controversial problems; and • anticipates future trends and requirements. 			
	FLD			

LEVEL 4-6		450 POINTS			
SERIES	General Natural Resources Management and Biological Sciences	0401	Genetics	0440	
	Microbiology	0403	Rangeland Management	0454	
	Pharmacology	0405	Soil Conservation	0457	
	Ecology	0408	Forestry	0460	
	Zoology	0410	Soil Science	0470	
	Physiology	0413	Agronomy	0471	
	Entomology	0414	Fish and Wildlife Administration	0480	
	Toxicology	0415	Fish Biology	0482	
	Botany	0430	Wildlife Refuge Management	0485	
	Plant Pathology	0434	Wildlife Biology	0486	
	Plant Physiology	0435	Animal Science	0487	
	Horticulture	0437			
	FLD	Nature of Assignment – Work involves:			
		<ul style="list-style-type: none"> • exceptionally broad and intensive efforts impacting functional areas and processes; and • problems of such scope and complexity that they require dividing work into components conducted concurrently or sequentially or using multi-disciplinary or cross-functional teams; and/or • continual efforts to establish concepts, theories, or programs, or resolve persistent problems. 			
What Needs To Be Done – To decide what needs to be done, the employee conducts extensive investigation and analysis of largely undefined factors and conditions. The employee determines the nature and scope of problems and devises solutions under the following conditions:					
<ul style="list-style-type: none"> • conflicting and changing goals and objectives; • highly controversial and politicized programs; • complexity in developing or complying with regulatory oversight; • theory and practices that are largely undefined; • practices that are in a state of development or are extensively affected by advances in technology; • unique characteristics of the environment that impose new management requirements; and/or • the need to balance environmental and ecological concerns with powerful commercial, industrial, and recreational interests. 					
Difficulty and Originality Involved in Doing the Work – The employee conducts continuing efforts to solve problems that have stubbornly resisted resolution. The employee:					
<ul style="list-style-type: none"> • develops policies and strategies, and leads efforts to address environmental or scientific issues in areas where precedents do not exist; • establishes new concepts and alternatives to problem identification and resolution; and/or • applies a high degree of abstraction to originate concepts, theories, or programs. 					

FACTOR 5 – SCOPE AND EFFECT

This factor covers the relationships between the nature of work (i.e., the purpose, breadth, and depth of the assignment), and the effect of work products or services both within and outside the organization. Effect measures whether the work output facilitates the work of others, provides timely services of a personal nature, or impacts the adequacy of research conclusions. The concept of effect alone does not provide sufficient information to properly understand and evaluate the impact of the position. The scope of the work completes the picture allowing consistent evaluations. Only consider the effect of properly performed work. The primary components of this factor are: **Scope of the Work** and **Effect of the Work**.

NOTE: All factor level descriptions (FLDs) apply to all 0400P occupational series in this JFS.

LEVEL 5-1		25 POINTS
SERIES	<p>General Natural Resources Management and Biological Sciences 0401</p> <p style="padding-left: 40px;">Microbiology 0403</p> <p style="padding-left: 40px;">Pharmacology 0405</p> <p style="padding-left: 40px;">Ecology 0408</p> <p style="padding-left: 40px;">Zoology 0410</p> <p style="padding-left: 40px;">Physiology 0413</p> <p style="padding-left: 40px;">Entomology 0414</p> <p style="padding-left: 40px;">Toxicology 0415</p> <p style="padding-left: 40px;">Botany 0430</p> <p style="padding-left: 40px;">Plant Pathology 0434</p> <p style="padding-left: 40px;">Plant Physiology 0435</p> <p style="padding-left: 40px;">Horticulture 0437</p>	<p>Genetics 0440</p> <p style="padding-left: 40px;">Rangeland Management 0454</p> <p style="padding-left: 40px;">Soil Conservation 0457</p> <p style="padding-left: 40px;">Forestry 0460</p> <p style="padding-left: 40px;">Soil Science 0470</p> <p style="padding-left: 40px;">Agronomy 0471</p> <p style="padding-left: 40px;">Fish and Wildlife Administration 0480</p> <p style="padding-left: 40px;">Fish Biology 0482</p> <p style="padding-left: 40px;">Wildlife Refuge Management 0485</p> <p style="padding-left: 40px;">Wildlife Biology 0486</p> <p style="padding-left: 40px;">Animal Science 0487</p>
FLD	<p>Scope of the Work – Work involves:</p> <ul style="list-style-type: none"> • specific, routine tasks that provide training in the occupation; and • assignments that familiarize the employee with the programs and services of the organization. <p>Effect of the Work – Work results facilitate the work of others and have little impact beyond the immediate organizational unit.</p>	

LEVEL 5-2		75 POINTS		
SERIES	General Natural Resources Management and Biological Sciences	0401	Genetics 0440	
	Microbiology	0403	Rangeland Management 0454	
	Pharmacology	0405	Soil Conservation 0457	
	Ecology	0408	Forestry 0460	
	Zoology	0410	Soil Science 0470	
	Physiology	0413	Agronomy 0471	
	Entomology	0414	Fish and Wildlife Administration 0480	
	Toxicology	0415	Fish Biology 0482	
	Botany	0430	Wildlife Refuge Management 0485	
	Plant Pathology	0434	Wildlife Biology 0486	
	Plant Physiology	0435	Animal Science 0487	
	Horticulture	0437		
	FLD	Scope of the Work – Work involves:		
		<ul style="list-style-type: none"> • advanced developmental assignments designed to expose the employee to varied processes, and a wide range of standards, procedures, theories, principles, and applications; • common issues and problems; and • a complete segment of an assignment or a project. 		
		Effect of the Work – Work results affect the overall accuracy, reliability, acceptability, and timeliness of the final work products or services developed or completed by higher graded coworkers.		

LEVEL 5-3		150 POINTS		
SERIES	General Natural Resources Management and Biological Sciences	0401	Genetics 0440	
	Microbiology	0403	Rangeland Management 0454 <u>Illustration(s)</u>	
	Pharmacology	0405	Soil Conservation 0457	
	Ecology	0408	Forestry 0460	
	Zoology	0410	Soil Science 0470 <u>Illustration(s)</u>	
	Physiology	0413	Agronomy 0471	
	Entomology	0414	Fish and Wildlife Administration 0480	
	Toxicology	0415	Fish Biology 0482	
	Botany	0430	Wildlife Refuge Management 0485	
	Plant Pathology	0434	Wildlife Biology 0486	
	Plant Physiology	0435	Animal Science 0487	
	Horticulture	0437		
	Scope of the Work – Work involves:			
	<ul style="list-style-type: none"> • investigating, analyzing, or advising on a variety of conventional resource or refuge problems and environmental conditions in accordance with established criteria; • identifying common problems involving plant and animal diseases, habitat conditions, or environmental impacts from recreational, commercial, and industrial operations; and • ensuring the effective development and use of multiple-use resources areas at the local level; 			
	and/or:			
	<ul style="list-style-type: none"> • performing the full range of routine tests, procedures, and activities; and • resolving a variety of problems, questions, or conditions in accordance with established precedents, laboratory procedures, and clinical practices. 			
	Effect of the Work – Work results affect the:			
<ul style="list-style-type: none"> • agency credibility with internal and external customers; and • adequacy, accuracy, and effectiveness of activities, such as field investigations, research studies, or laboratory services; 				
and/or efficient utilization, development, protection, and management of natural resources and socioeconomic well-being of lease and permit holders and other users of natural resources.				
FLD				

LEVEL 5-4		225 POINTS		
SERIES	General Natural Resources Management and Biological Sciences	0401	Genetics 0440	
	Microbiology	0403	Rangeland Management 0454 <u>Illustration(s)</u>	
	Pharmacology	0405	Soil Conservation 0457	
	Ecology	0408	Forestry 0460 <u>Illustration(s)</u>	
	Zoology	0410	Soil Science 0470	
	Physiology	0413	Agronomy 0471	
	Entomology	0414	Fish and Wildlife Administration 0480	
	Toxicology	0415	Fish Biology 0482 <u>Illustration(s)</u>	
	Botany	0430	Wildlife Refuge Management 0485 <u>Illustration(s)</u>	
	Plant Pathology	0434	Wildlife Biology 0486	
	Plant Physiology	0435	Animal Science 0487	
	Horticulture	0437		
	Scope of the Work – Work involves:			
	<ul style="list-style-type: none"> investigating, analyzing, and evaluating problems and situations involving a wide variety of circumstances or unusual conditions; developing new or improved techniques, criteria, or alternatives to meet requirements involving specific natural resources, research problems, and issues, or agency clinical activities; and upgrading current capabilities involving natural resources or research activities; 			
	and/or assessing program effectiveness.			
	FLD	Effect of the Work – Work results affect the:		
		<ul style="list-style-type: none"> effectiveness and acceptability of agency goals, programs, and activities; continued existence of a resource or resource area in compliance with applicable legislation, regulation, and agency policy, and in the public interest; and/or agricultural, commercial, industrial, and recreational uses and conditions; 		
or:				
<ul style="list-style-type: none"> a wide range of scientific activities within the agency; and the planning and direction of major investigatory or scientific projects. 				

LEVEL 5-5		325 POINTS		
SERIES	General Natural Resources Management and Biological Sciences	0401	Genetics 0440	
	Microbiology	0403	Rangeland Management 0454	
	Pharmacology	0405	Soil Conservation 0457	
	Ecology	0408	Forestry 0460	
	Zoology	0410	Soil Science 0470	
	Physiology	0413	Agronomy 0471	
	Entomology	0414	Fish and Wildlife Administration 0480	
	Toxicology	0415	Fish Biology 0482	
	Botany	0430	Wildlife Refuge Management 0485	
	Plant Pathology	0434	Wildlife Biology 0486	
	Plant Physiology	0435	Animal Science 0487	
	Horticulture	0437		
FLD	Scope of the Work – Work involves:			
	<ul style="list-style-type: none"> • isolating and defining critical conditions and problems within a program or part of a project; • resolving critical problems of limited scope impacting natural resources that affect multiple stakeholders; • determining the validity and soundness of theories, standards, and guides for improving resource uses or research activities; • coordinating activities to meet economic needs while promoting sound resource conservation; and • providing guidance and assistance to public and private organizations; 			
	and/or:			
<ul style="list-style-type: none"> • conducting assays of all products under regulatory control and in the area of functional responsibility, and developing new assay methods and new interpretations of findings; or • designing simulation or optimization models to contribute to interdisciplinary multi-resource evaluation procedures. 				
Effect of the Work – Work results affect:				
<ul style="list-style-type: none"> • development of major aspects of agency programs, long-range plans, and/or missions; • well-being of a large number of people on a short-term basis; • major activities of private organizations; • operations of other Government agencies; and/or • the state-of-the-art in the area of functional responsibility. 				

LEVEL 5-6		450 POINTS		
SERIES	General Natural Resources Management and Biological Sciences	0401	Genetics 0440	
	Microbiology	0403	Rangeland Management 0454	
	Pharmacology	0405	Soil Conservation 0457	
	Ecology	0408	Forestry 0460	
	Zoology	0410	Soil Science 0470	
	Physiology	0413	Agronomy 0471	
	Entomology	0414	Fish and Wildlife Administration 0480	
	Toxicology	0415	Fish Biology 0482	
	Botany	0430	Wildlife Refuge Management 0485	
	Plant Pathology	0434	Wildlife Biology 0486	
	Plant Physiology	0435	Animal Science 0487	
	Horticulture	0437		
	<p>Scope of the Work – Work involves planning, developing, and implementing major agency programs, projects, or activities of national scope and significance, and/or especially critical, sensitive, and controversial issues related to an area of assigned responsibility.</p>			
	FLD	<p>Effect of the Work – Work results affect:</p>		
		<ul style="list-style-type: none"> • programs that are essential to the agency mission; • large numbers of people on a long-term or continuing basis; or • decisions and proposals that have a long-term effect on public and private organizations and/or regulated industries. 		

FACTOR 6 – PERSONAL CONTACTS AND FACTOR 7 – PURPOSE OF CONTACTS

These factors include face-to-face and remote dialogue – e.g., telephone, email, and video conferences – with persons not in the supervisory chain. (Personal contacts with supervisors are under Factor 2 – Supervisory Controls.) The levels of these factors consider the work required to make the initial contact, difficulty of communicating with those contacted, the setting in which the contact takes place, and the nature of the discourse. The setting describes how well the employee and those contacted recognize their relative roles and authorities. The nature of the discourse defines the reason for the communication and the context or environment in which the communication takes place. For example, the reason for communicating may be to exchange factual information or to negotiate. The communication may take place in an environment of significant controversy and/or with people of differing viewpoints and goals.

Only credit points under Factors 6 and 7 for contacts that are essential for successfully performing the work and that have a demonstrable impact on its difficulty and responsibility. Factors 6 and 7 are interdependent, so use the same personal contacts to evaluate both factors.

Determine the appropriate level for Personal Contacts and the corresponding level for Purpose of Contacts. Obtain the point value for these factors from the intersection of the two levels as shown on the [Point Assignment Chart](#) at the end of this section.

NOTE: These factor level descriptions (FLDs) apply to all 0400P occupational series in this JFS.

PERSONAL CONTACTS	
Level 1	Other professionals, technicians, and support personnel in the immediate office or related units within the agency. Limited contact with the public and employees outside the office.
Level 2	Employees in the same agency and/or with members of the public in a moderately structured setting. Contacts may include professionals and specialists in different functional areas within the agency and at different organizational levels.
Level 3	Individuals or groups inside and outside the employing agency representing high levels of organizations internal and external to the Federal Government. Typical contacts are with: <ul style="list-style-type: none"> • contractors; • legal professionals; • representatives of community action committees; • management officials or senior technical staff of corporations; and • Federal agencies, academia, or professional organizations.
Level 4	High-ranking officials from outside the employing department or agency at national or international levels in highly unstructured settings. Typical contacts at this level include: <ul style="list-style-type: none"> • leaders of national stakeholder and/or interest groups; • presidents of large national or international firms; • national news media; • State governors, mayors of large cities, or tribal leaders; • Members of Congress; and • Presidential advisors and cabinet-level appointees of major departments and agencies.

PURPOSE OF CONTACTS	
Level A	To obtain, clarify, or exchange information or facts needed to complete an assignment.
Level B	To plan, coordinate, or advise on work efforts, or to resolve issues or operating problems. Contacts involve influencing or persuading people who are working toward mutual goals and have cooperative attitudes. Contacts typically involve identifying options for resolving problems.
Level C	To influence and persuade persons or groups who may be skeptical or uncooperative. Employees must be experienced in approaching the individual or group to obtain the desired effect, such as gaining compliance with established policies or acceptance of established methods using persuasion or negotiation, or establishing rapport to gain information.
Level D	To justify, defend, negotiate, or settle matters involving significant or controversial issues and/or programs. Work at this level usually involves active participation in conferences, meetings, hearings, or presentations involving problems or issues of considerable consequence or importance. Persons contacted typically have diverse viewpoints, goals, or objectives. The employee must achieve a common understanding of the problem and a satisfactory solution by persuading, compromising, or developing suitable alternatives.

POINT ASSIGNMENT CHART					
		Purpose of Contacts			
Level		A	B	C	D
Personal Contacts	1	30	60	130*	230*
	2	45	75	145	245
	3	80	110	180	280
	4	130*	160	230	330

*THIS COMBINATION IS UNLIKELY

FACTOR 8 – PHYSICAL DEMANDS

NOTE: Laws and regulations governing pay for irregular or intermittent duty involving unusual physical hardship or hazard are in *section 5545(d), title 5, United States Code, and Subpart I, part 550, title 5, Code of Federal Regulations.*

NOTE: These factor level descriptions (FLDs) apply to all 0400P occupational series in this JFS.

LEVEL 8-1	5 POINTS
<p>Work is sedentary. Some work requires periods of walking, standing, bending, climbing, or driving a motor vehicle. Employees occasionally carry light items, such as books, small instruments or samples, and other similar materials. The work does not require any special physical effort.</p>	
LEVEL 8-2	20 POINTS
<p>Work requires long periods of standing; walking or riding horses over rough terrain; recurring bending, crouching, stooping, reaching, or similar activities. Work may also include frequent lifting of moderately heavy items, such as equipment and samples that weigh less than 23 kilograms or approximately 50 pounds.</p>	
LEVEL 8-3	50 POINTS
<p>Work requires considerable and strenuous physical exertion and exposure to extreme conditions, such as:</p> <ul style="list-style-type: none"> • frequent crouching or crawling over rough, uneven, or rocky terrain; • lifting heavy objects that weigh over 23 kilograms or approximately 50 pounds; and • hostile wildlife, or chemical, biological, or physical hazards for which protective precautions are required or mandated by law. 	

FACTOR 9 – WORK ENVIRONMENT

Note: Laws and regulations governing pay for irregular or intermittent duty involving unusual physical hardship or hazard are in *section 5545(d), of title 5, United States Code, and Subpart I of part 550 of title 5, Code of Federal Regulations.*

NOTE: These factor level descriptions (FLDs) apply to all 0400P occupational series in this JFS.

LEVEL 9-1	5 POINTS
<p>Work is usually performed in an office setting. The work area:</p> <ul style="list-style-type: none"> • normally involves everyday risks or discomforts that require normal safety precautions typical of offices or meeting and training rooms; or • may involve occasional exposure to a laboratory that involves risks and hazards that require safety precautions. 	

LEVEL 9-2	20 POINTS
<p>Work involves exposure to moderate risks and discomforts, such as those due to:</p> <ul style="list-style-type: none"> • adverse weather conditions, such as high winds and low or high temperatures; • crowded or constricted maritime docks or ship cargo areas; • travel in safety approved small air and water craft and off-road vehicles; • irritating chemicals; • noxious fumes; • flammable liquids; • falling trees; • hostile wildlife; • poisonous insects, plants, or snakes; • radiation; • potentially pathogenic bacteria; • contagious diseases; and/or • carcinogenic materials. <p>Work requires special safety precautions and/or protective clothing and equipment.</p>	

LEVEL 9-3	50 POINTS
<p>Work involves high risk of exposure or damage due to:</p> <ul style="list-style-type: none"> • extreme weather conditions; • working at great heights in remote locations; • hazardous chemicals; • wildland fires; • serious confrontations with armed hunters; or • working with lethal viruses. <p>The employee applies a wide range of safety precautions when controlled conditions deteriorate due to unforeseen conditions or previously unknown risks.</p>	

FACTOR ILLUSTRATIONS

Illustrations are provided in this part as a tool to give insight into the meaning of the FLDs for Factors 1, 4, and 5. Consider each illustration in its entirety and in conjunction with the FLDs. Do not rely solely on these illustrations in evaluating positions.

For additional information about the proper use of illustrations, see the [How to Use This Grading Information](#) section of this JFS.

FACTOR 1 ILLUSTRATIONS

LEVEL 1-6: MICROBIOLOGIST, 0403

Knowledge of, and skill in applying, the principles, concepts, and techniques applicable to a limited scientific area of microbiology work in a medical laboratory

sufficient to:

- work with commonly known pathogenic bacteria and fungi;
- collect and test specimens to determine what forms are present or absent;
- ensure that the full range of routine methods, procedures, techniques, and applicable quality controls have been correctly conducted; and
- conduct preliminary microbiological diagnostic services that involve pathogenic organisms that are difficult to identify.

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LEVEL 1-6: ENTOMOLOGIST, 0414

Knowledge of, and skill in applying:

- the principles, concepts, and methods of entomology;
- related biological, mathematical, statistical, and physical sciences;
- beekeeping techniques;
- environmental regulations about using pesticides; and
- standard data collection, analysis, and reporting techniques

sufficient to:

- collect data on honeybee colonies and honeybee parasites;
- maintain honeybee colonies;
- perform recurring tests and analyses;
- evaluate methodologies and quality control procedures;
- make minor modifications to established procedures and protocols;
- interpret and report data; and
- calibrate and operate laboratory equipment.

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LEVEL 1-6: RANGELAND MANAGEMENT SPECIALIST, 0454 (ILLUSTRATION 1)

Knowledge of, and skill in applying:

- principles, concepts, methods, and functions of rangeland management to projects for rangeland improvements; and
- grazing permit program policies and procedures, together with applicable Federal, state, local, and tribal statutes and regulations governing rangeland management and use

sufficient to:

- assess the impact of land use practices on forage and browse, water, and other resources in the assigned area;
- evaluate requests for grazing, recreational, and oil or gas exploration permits, timber, prescribed burning, or other activities affecting rangelands;
- determine the optimal level of activity (e.g., number and nature of livestock, season and duration of grazing use, campers, and river runners) to ensure continued or improved rangeland conditions in the assigned area;
- recommend allowable parameters and limits under which permits may begin or continue to operate;
- recommend rejection of requests; and
- prepare reports on findings and recommendations.

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LEVEL 1-6: RANGELAND MANAGEMENT SPECIALIST, 0454 (ILLUSTRATION 2)

Knowledge of, and skill in applying:

- principles and concepts of multi-disciplinary biological sciences, such as biology, botany, and soil science;
- principles, concepts, and methods of fire program management;
- agency rangeland management criteria and policies regarding the role of fire and fire suppression in public lands; and
- various types of fuel and equipment used to initiate and control fire as a rangeland management tool

sufficient to:

- survey the condition of assigned rangeland and determine the potential impact of prescribed burning on the health of native grasses;
- assess the impact of fire on grassland conditions, soil nutrients, erosion, and exotic plant life in an assigned area;
- assess weather conditions and their potential effect on initiating and controlling rangeland fires;
- draft a prescribed burning plan including timeframes, conditions, fuels, and fire control protocol for ensuring the effective use of fire in fostering the health and productivity of the area; and
- implement an approved rangeland management plan to guide use of prescribed burning to enhance productivity and prevent encroachment of non-native plant and animal life.

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LEVEL 1-6: SOIL CONSERVATIONIST, 0457

Knowledge of, and skill in applying:

- principles, concepts, methodology, and practices of soil conservation and related biological, statistical, mathematical, and physical sciences;
- pertinent engineering practices;
- agency soil conservation regulations, policies, and procedures; and
- local laws and regulations pertaining to soil management

sufficient to advise community and rural organizations and groups on:

- developing conventional conservation plans involving proposed subdivision sites and needed erosion control measures;
- protecting urban slopes from surface water run-off damage;
- interpreting soil survey data for community-owned land sites; and
- developing standard farm conservation plans.

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LEVEL 1-6: FORESTER, 0460

Knowledge of, and skill in applying:

- principles, concepts, and practices of forestry and related disciplines, such as entomology;
- agency programs, policies, and resource management objectives;
- engineering construction and maintenance practices; and
- contract and legal provisions and content requirements

sufficient to:

- recommend a program for small sales of timber products and for the free use of forest products, including commercial thinning, timber trespass, harvesting logs and fuel wood, and salvaging timber damaged by disease, insects, or wind;
- analyze conditions in areas affected by drought, insects, disease, wind damage, or fire;
- recommend silviculture prescriptions to treat or salvage timber through sales;
- analyze environmental impact and prepare environmental assessment reports;
- determine method of sale and special sale requirements, such as erosion control measures, slash disposal, sale area betterment, resources protection measures, and road maintenance;
- prepare contract packages;
- inspect contractor operations for contract compliance; and
- prepare reports on findings and recommendations.

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LEVEL 1-6: SOIL SCIENTIST, 0470

Knowledge of, and skill in applying:

- the principles, concepts, and techniques of soil science including soil genesis and geomorphology, soil classification and correlation, photo interpretation, and soil-landscape relationships;
- other related disciplines, such as geology, mathematics, and statistics; and
- agency soil science programs, policies, and procedures

sufficient to:

- produce soil maps;
- classify soils;
- prepare soil survey manuscripts;
- interpret soil information according to technical standards;
- prepare soil descriptions, field notes, map unit descriptions, taxonomic unit descriptions; and
- prepare technical and nontechnical reports.

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LEVEL 1-7: ECOLOGIST, 0408

Knowledge of, and skill in applying:

- a wide range of principles, concepts, practices, and methods of desert ecology;
- related disciplines of wildlife biology, and plant sciences;
- agency policies and procedures;
- biological investigative methods;
- wildlife management practices and principles; and
- desert vegetation and interrelationships of living organisms and the desert environment

sufficient to:

- develop, conduct, and evaluate desert ecosystem management studies;
- analyze ecological, botanical, and faunal issues and problems related to desert ecosystems;
- provide technical solutions to complex desert habitat management programs;
- adapt, develop, or modify ecological techniques and procedures;
- devise new strategies, restoration, or management plans for desert ecosystems; and
- prepare technical or scientific reports of findings and recommendations.

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LEVEL 1-7: ENTOMOLOGIST, 0414

Knowledge of, and skill in applying:

- a wide range of principles, concepts, practices, and methodology of entomology;
- related disciplines of taxonomy, phylogeny, morphology, biology, ecology, plant taxonomy, and economic botany; and
- regulatory authorities, operational activities, quarantine regulations, and restrictive orders and treatments

sufficient to:

- perform complex pest identifications and risk analyses;
- determine the economic significance of pests;
- keep abreast of current research and new developments in the field;
- apply the latest scientific advances to pest identification and risk assessment methodologies; and
- prepare scientific reports for publication.

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LEVEL 1-7: RANGELAND MANAGEMENT SPECIALIST, 0454

Knowledge of, and skill in applying:

- a wide range of principles, concepts, and methods applicable to a variety of rangeland management functions and objectives;
- related biological sciences, such as biology, botany, ecology and entomology;
- criteria for assessing and balancing the impact of multiple land uses on the environmental health of native grasses, water resources, and other resources in the assigned area;
- agency land use permit program policies and procedures, together with applicable Federal statutes, regulations, and programs governing rangeland conservation practices;
- local and tribal customs regarding access to and use of public lands; and
- regulatory authorities regarding trespass and other prohibited activities on Federal lands

sufficient to plan and execute, for a field office, a variety of rangeland management activities, such as:

- issuing permits;
- eradicating or controlling non-native species of plant and animal life;
- stimulating biological diversity;
- overseeing a public outreach program;
- maintaining field office facilities, such as roads, bridges, and buildings;
- planning, designing, and implementing new biological studies and projects to gauge rangeland conditions; and
- alleviating problems, restoring rangeland health, improving productivity, and facilitating compatible land use.

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LEVEL 1-7: FORESTER, 0460 (ILLUSTRATION 1)

Knowledge of, and skill in applying:

- a wide range of forestry land management principles, concepts, and practices;
- related disciplines, such as wildlife biology, ecology, landscape architecture, hydrology, and soil science;
- forest economics and valuation;
- agency forestry land management regulations and policies; and
- timber sale contracts and standards for sale oversight

sufficient to:

- plan, coordinate, and evaluate timber sale contract administration;
- develop and execute timber sale appraisals, contracts, and permits;
- achieve timber harvest land management objectives;
- resolve controversial timber contract problems; and
- incorporate and resolve conflicting considerations in timber sale contract preparation and administration processes.

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LEVEL 1-7: FORESTER, 0460 (ILLUSTRATION 2)

Knowledge of, and skill in applying:

- a wide range of concepts, principles, and practices of forestry land management;
- related disciplines of biological, physical, or mathematical sciences, or engineering;
- silvics, dendrology, reforestation methods, timber stand improvement, timber harvesting, and forest mensuration;
- the interrelationship of physical and biological factors, such as climate characteristics, plant and animal association, soil microorganisms, and their influences on the kind and time of silvicultural treatment necessary and appropriate to achieve multiple use land management objectives; and
- laws, regulations, and agency and state land management policies and procedures

sufficient to:

- develop, review, implement, and resolve complex problems on multiple use, sustained yield ecosystem management, and biodiversity programs;
- develop programs and provide solutions to complex problems covering an array of environmental conditions on varied forest units and successional stages;
- ensure that silvicultural plans and programs are consistent with agency and state policies and procedures;
- develop new long-term natural resources management plans;
- evaluate new scientific theories and technical practices and developments to determine their applicability and cost effectiveness;
- review scientific literature and technical publications; and
- assess the environmental impact of various natural resources management plans.

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LEVEL 1-7: SOIL SCIENTIST, 0470

Knowledge of, and skill in applying:

- a wide range of principles, concepts, and practices of soil science including soil genesis, soil morphology, soil formation, soil classification, and soil taxonomy;
- related disciplines of biological and physical sciences;
- soil survey concepts, mathematics, map units, taxonomic units, soil correlation, and soil interpretations;
- Ground Penetrating Radar (GPR);
- state and local government regulations and agency policies and goals; and
- soil and water conservation principles and techniques

sufficient to:

- conduct on-site investigations and soil mapping to resolve problems of various intensities;
- gather and integrate data on soil characteristics, geology, and geomorphology;
- operate GPR equipment and interpret graphic printouts for soil classification and correlation;
- evaluate the results of a broad range of laboratory chemical and physical tests of soil and water;
- define soil mapping units where soils are little known and in intricate patterns;
- describe each unit incorporating factors, such as slope range, soil textures, degree of stoniness, and expected uses; and
- recommend inclusion in the soil survey area.

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LEVEL 1-7: FISH BIOLOGIST, 0482

Knowledge of, and skill in applying:

- the concepts, principles, practices, and techniques of fish biology;
- related disciplines of mathematics, statistics, hydrology, ecology, and geology;
- fish management policies and procedures; and
- field biology and population modeling

sufficient to:

- conduct biological surveys for preserving, rehabilitating, and enhancing fish populations;
- develop and implement fish population and community models to evaluate fish community dynamics;
- diagnose and select treatments for nutritional disorders;
- develop and test new diets and treatments;
- prepare, implement, and evaluate fish management plans;
- formulate and recommend new policies and practices on fish habitat restoration;
- recommend changes that affect the production, distribution, and use of Federal hatchery fish; and
- prepare scientific reports.

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LEVEL 1-7: WILDLIFE REFUGE MANAGEMENT SPECIALIST, 0485

Knowledge of, and skill in applying:

- a wide range of principles and concepts of wildlife management and conservation biology;
- related disciplines of soil science, hydrology, plant and wildlife diseases, restoration ecology, forestry, rangeland management, and fire ecology;
- applicable laws and agency policies, objectives, planning, and management activities related to the National Wildlife Refuge System;
- state, local, and tribal laws, customs, mores, and economic interest; and
- an understanding of the interrelationships of programs and functions within the agency, and between the agency and other entities

sufficient to:

- plan, develop, coordinate, and manage the resolution of complex and controversial resource use issues and problems related to a wildlife refuge;
- control waterfowl deprivation problems associated with a refuge located in an area of intensive agricultural development;
- control disease outbreaks occurring among large concentrations of waterfowl;
- manage a large, diverse, and complex cooperative farming program; and/or
- operate a large and/or diversified hunting program consistent with law, agency regulations, and local customs.

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LEVEL 1-7: WILDLIFE BIOLOGIST, 0486

Knowledge of, and skill in applying:

- a wide range of principles, concepts, and practices of wildlife biology and wildlife habitat management;
- related disciplines, such as conservation biology, soil science, botany, ecology, hydrology, and statistics;
- agricultural practices; and
- agency policies and procedures

sufficient to:

- develop and implement wildlife and habitat inventory, monitoring, and research protocols;
- determine the ecological forces, such as hydrology and fire that shape endemic habitats and wildlife;
- evaluate the impact of a wide range of intensive resource management techniques on wildlife;
- modify standard techniques, processes, and procedures to overcome significant resources problems related to species production, protection, and habitat restoration;
- develop habitat management prescriptions that significantly depart from previous approaches to achieve habitat and wildlife population goals;
- prepare, execute, and evaluate annual and long-range wildlife management plans; and
- prepare scientific reports and presentations.

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LEVEL 1-8: ECOLOGIST, 0408

Mastery of, and skill in applying, advanced theories, principles, concepts, and practices of ecology and related disciplines of biological, physical, and mathematical sciences sufficient to:

- serve as a recognized scientific expert in wetland plants and plant-soil relationships including planning and executing significant wetland classification, inventory, monitoring, and assessments;
- develop program criteria to establish accurate and consistent classification of wetland communities;
- provide scientific leadership in specialized studies of significant ecological problems and issues; and
- design significant wetland ecology improvement projects.

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LEVEL 1-8: RANGELAND MANAGEMENT SPECIALIST, 0454

Mastery of, and skill in applying:

- advanced principles, concepts, methods, and new scientific findings and developments in rangeland management and related fields, such as hydrology, soil science, and wildlife habitat;
- wildlife habitat management, including managing threatened and endangered species and recreation and cultural resources programs; and
- principles of multiple-use sustained yield management of rangeland resources

sufficient to:

- apply scientific findings, developments, and advances in resources assessment techniques to solve critical and complex rangeland problems resulting from differing social and economic beliefs, unique environmental characteristics, historic resource abuse, and multiple demands for water, vegetation and other resources;
- solve problems where current information is inconclusive or is in the form of suppositions or theories as to their effectiveness in treating specific resource problems;
- develop or refine new solutions or recommendations to problems that have significant impact on existing agency policies and programs;
- extend existing techniques or develop new alternatives for use by other rangeland management specialists or private landowners;
- interpret broad rangeland conservation legislative requirements and develop policy guidelines;
- play a key role in the overall planning and management of the rangeland management program; and
- develop long-term multiple use plans and regional goals.

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LEVEL 1-8: SOIL CONSERVATIONIST, 0457

Mastery of, and skill in applying:

- advanced theories, principles, and concepts of soil conservation;
- related fields, such as agronomy, soil science, forestry, and agricultural engineering;
- natural resources planning methods, techniques, and precedents; and
- techniques for evaluating the performance of the agency's soil and water conservation program

sufficient to:

- develop, propose, and recommend significant program innovations or changes in multiple soil conservation program criteria;
- investigate to determine appropriate action including suspension, revision, or termination of experimental soil and water conservation data and applications; and
- modify, alter, and adjust natural resources planning methods and techniques to resolve difficult water quality and serious watershed development problems.

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LEVEL 1-8: SOIL SCIENTIST, 0470

Mastery of, and skill in applying, advanced theories, concepts, principles, and standards of soil science and related disciplines of biological and physical sciences sufficient to:

- serve as the agency's expert on the Soil Taxonomy program and the National Cooperative Soil Survey;
- analyze and develop recommendations on agency Soil Taxonomy program policy;
- provide leadership that results in broad and substantial acceptance of the Soil Taxonomy as a soil classification system; and
- systematically evaluate and integrate new concepts and theories of soil genesis and classification.

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LEVEL 1-8: FISH BIOLOGIST, 0482

Mastery of, and skill in applying, advanced theories, concepts, principles, and practices of aquatic biology and related sciences, such as ecology and toxicology sufficient to:

- provide technical leadership on aquatic toxicity to ensure the biological integrity of streams;
- plan, conduct, and lead other scientists in large surveys on freshwater and estuarine water bodies to determine the presence of toxic conditions;
- analyze and evaluate a wide variety of biological, physical, and chemical data related to water quality in both point and non-point source pollutants;
- ensure the best scientific practices are used by regulated entities to conform to Federal regulations, policy and procedures; and
- coordinate and lead water quality investigations involving other Federal agencies, state, tribal, and local agencies, and private industry.

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LEVEL 1-8: WILDLIFE REFUGE MANAGEMENT SPECIALIST, 0485

Mastery of, and skill in applying:

- advanced theories, principles, concepts, and practices of wildlife biology, animal ecology, wildlife refuge administration, and habitat manipulation;
- related biological and physical science disciplines, such as botany, ornithology, and mammalogy; and
- applicable laws, regulations, policies, and procedures of the agency and other associated agencies

sufficient to:

- serve as a recognized authority for a full range of significant scientific and non-scientific refuge issues affecting or related to managing refuge lands;
- resolve operational and administrative problems for which current information is inconclusive or lacking altogether; and
- develop innovative solutions to complex resource and land management issues that have controversial environmental impact and involve conflicting or unclear law and policy.

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LEVEL 1-9: PHYSIOLOGIST, 0413

Mastery of, and skill in applying:

- theories, principles, concepts, and practices of molecular biology and genome analysis, related specialized biological sciences, mathematics, and statistics;
- Federal laws, agency regulations, guidelines, and professional standards pertaining to molecular biology research; and
- computer programming, database development, and systems integration

sufficient to:

- conceive of, design, and direct development of database systems that support integrating biological studies, methods, analyses, and statistical software tools;
- conceive, propose, and evaluate hypotheses relevant to extrapolating experimental findings for use in predicting possible adverse effects to humans;
- design and test biological models using state-of-the-art mathematical and statistical tools; and
- adapt biological models to emerging theories and concepts in molecular biology research.

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LEVEL 1-9: RANGELAND MANAGEMENT SPECIALIST, 0454

Mastery of, and skill in applying, advanced theories, principles, concepts, and practices of rangeland management, plants, ecology, inventories, studies, improvements, and rangeland planning. Additionally, mastery of and skill in applying the related disciplines of plant, animal, and soil sciences, such as taxonomy, plant physiology, plant ecology, animal nutrition, livestock production, and soil morphology and classification sufficient to:

- generate new rangeland management concepts and methodologies that advance the field;
- theorize and plan agency rangeland management programs for broad, emerging, or critical agency missions where no precedents exist;
- design novel approaches to achieve compliance with new legislation and with new interpretations of the environmental goals of existing legislation; and
- create rangeland management programs that balance the economic health of agricultural, commercial, and/or industrial interests with the goals of environmental groups and the Government's national environmental policies.

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LEVEL 1-9: WILDLIFE REFUGE MANAGEMENT SPECIALIST, 0485

Mastery of, and skill in applying, advanced theories, principles, concepts, and practices of a broad range of professional disciplines within the field of wildlife refuge administration, as well as comprehensive knowledge of related biological and physical science disciplines, such as ecology, botany, forestry, and hydrology; and knowledge of governing legislation sufficient to:

- interpret and achieve compliance with new legislation;
- develop and apply new concepts and innovative and creative systems for wildlife refuge management;
- create and integrate new concepts of wildlife management into applications that meet multiple resource management needs;
- anticipate needs and changes for principal agency wildlife refuge management programs and develop long-range innovative and novel solutions;
- generate new theoretical and programmatic concepts for managing rangeland ecosystems;
- publish ground-breaking studies of substantive wildlife refuge issues that lead the wildlife refuge community to adopt new management practices; and
- design agreements that are models for multiple entity funding of wildlife resource activities.

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FACTOR 4 ILLUSTRATIONS

LEVEL 4-2: RANGELAND MANAGEMENT SPECIALIST, 0454

Nature of Assignment – Work involves determining the current condition of rangeland resources and whether grazing and lease permit holders are complying with permit requirements.

What Needs To Be Done – To decide what needs to be done, the employee:

- chooses from among many conventional rangeland survey methods, the method appropriate for the task to be performed;
- recognizes non-compliance with permit requirements; and
- records observations and identifies any discrepancies.

Difficulty and Originality Involved in Doing the Work – The employee reports rangeland conditions and permit non-compliance using established reporting procedures.

LEVEL 4-3: MICROBIOLOGIST, 0403

Nature of Assignment – Work involves performing a variety of diagnostic microbiological and chemical tests of foods, such as dairy products, ground beef, salads, canned food, and water.

What Needs To Be Done – To decide what needs to be done, the scientist:

- determines the acceptability of control samples by evaluating samples in accordance with microbial standards for quality and hygiene condition, contractual compliance, and the presence of pathogenic organisms;
- selects the appropriate analytical test to be performed based on the source and nature of the suspected problem;
- applies standard plate counts, coliform counts, yeast and mold counts, and other tests to quantify microorganisms; and
- selects specialized equipment, such as microscopes, autoclaves, balance, and centrifuges.

Difficulty and Originality Involved in Doing the Work – The scientist works with a wide variety of foods and a broad range of suspected problems, each of which may require a different test approach and interpretive skills.

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LEVEL 4-3: ENTOMOLOGIST, 0414

Nature of Assignment – Work involves performing a variety of field and laboratory research on honeybees.

What Needs To Be Done – To decide what needs to be done, the scientist:

- searches scientific literature to determine the most appropriate methods, procedures, and quality and safety controls for experiments; and
- recognizes the need to modify protocols to meet objectives.

Difficulty and Originality Involved in Doing the Work – The scientist determines appropriate data collection methodology, data sample reliability, and the acceptability of honeybee data.

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LEVEL 4-3: FORESTER, 0460

Nature of Assignment – Work involves the preliminary steps in deciding to conduct a timber sale and salvage program.

What Needs To Be Done – To decide what needs to be done the employee analyzes and evaluates:

- logging methods;
- terrain and soil differences;
- resource protection;
- wildlife needs;
- recreation use;
- proposed regeneration;
- the impact of sales on management objectives;
- marketability of products; and
- contractual requirements of the sale, such as soil erosion control, resource protection measures, and road maintenance.

Difficulty and Originality Involved in Doing the Work – The employee selects and applies standard techniques and practices to gather data in support of decisions on timber sales.

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LEVEL 4-4: RANGELAND MANAGEMENT SPECIALIST, 0454

Nature of Assignment – Work involves conducting ecological site and range inventories to analyze the impact of various land practices on wild horses and burros and recommend improvements.

What Needs To Be Done – To decide what need to be done, the employee:

- evaluates the rainfall fluctuation impact on forage production, utilization, and allocation among horses, burros, other wildlife, and livestock;
- evaluates other competing, changing, and fragile resources, such as wintering areas, endangered species habitat, erosive soils, and permit holder accesses;
- studies trends in horse and other animal population census, dynamics, and seasonal movements while watching for unusual distributions and changes; and
- balances various resource uses against the cost of projects, considering the benefit to horses and burros, ecological constraints, public interest, and political consequences of actions taken or not taken.

Difficulty and Originality Involved in Doing the Work – The employee exercises considerable judgment and originality to compensate for incomplete data or data of questionable reliability from outside sources.

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LEVEL 4-4: SOIL SCIENTIST, 0470

Nature of Assignment – Work involves:

- performing preliminary soil survey investigations as they relate to crop growth;
- conducting soil surveys;
- classifying and mapping soils;
- identifying soil chemical, physical, biological, and mineralogical composition;
- developing and maintaining the project soil survey database;
- determining responses to various soil types, crop fertilizers, tillage, and rotation; and
- preparing the initial soil survey manuscript.

What Needs To Be Done – To decide what needs to be done, the employee:

- researches unusual soils for proper classification and interpretation;
- considers the movement of substances, such as nutrients and pesticides through the soil profile;
- determines whether soil conditions are the source of crop deficiencies; and
- assesses the scope of soil degradation, erosion, and problems, such as wetness.

Difficulty and Originality Involved in Doing the Work – The employee uses considerable judgment to:

- plan and conduct soil surveys to meet the objectives of the soil survey program;
- design a protocol to complete soil survey updates;
- ensure that soil survey work meets modern standards;
- apply and adapt established standards to soil survey operations; and
- conduct survey work in areas where soils are diverse and occur in complex patterns.

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LEVEL 4-5: TOXICOLOGIST, 0415

Nature of Assignment – Work involves developing and evaluating guidelines, policies, and strategies to assess risk to human health and the environment from toxic elements.

What Needs To Be Done – To decide what needs to be done, the employee:

- reviews laws and agency regulations, policies, and standards on toxic substances;
- reviews comparative risk studies of toxicology factors involving multi-faceted problems;
- considers public perceptions of scientific findings about the dangers of specific toxic elements;
- studies new scientific and technological advances in toxicology and related biological and physical sciences; and
- assesses the competing interests of commercial and industrial users, and public safety advocates.

Difficulty and Originality Involved – The employee uses judgment and originality to:

- devise strategies that require balancing industrial and commercial economic interests and public safety;
- devise sampling plans unique to the problem or issue to be resolved;
- develop potentially precedent-setting toxicity standards and clean-up goals for environmental sites;
- work with major uncertainties concerning scientific standards for toxicity levels and related legal and regulatory requirements; and
- respond to rapid and continual changes in scientific findings identifying toxic elements and defining potency levels.

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LEVEL 4-5: RANGELAND MANAGEMENT SPECIALIST, 0454

Nature of Assignment – Work involves developing rangeland program guidance based on detailed integration of plant and animal biology, soil ecology, and rangeland conservation within the legal, regulatory, and policy framework surrounding public land management.

What Needs To Be Done – To decide what needs to be done, the employee:

- weighs competition among different types of grazing animals and livestock;
- assesses the cost and benefits of improvements to existing rangeland facilities;
- assesses the impact of recreational, commercial, and industrial uses on environmental goals and objectives; and
- considers the legal, regulatory, and policy frameworks surrounding public land management.

Difficulty and Originality Involved – The employee use judgment to assess:

- extreme variety in topography, soil types, vegetation types, rainfall patterns, and established uses;
- existing rangeland improvements;
- the physiological needs of grazing animals and plants; and
- consistency with legal, regulatory, and policy frameworks surrounding public land policy.

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LEVEL 4-5: FISH BIOLOGIST, 0482

Nature of Assignment – Work involves interpreting and developing complex policies, rules, manuals, laws, and scientific and technological information and providing technical expertise in fish and riparian area management.

What Needs To Be Done – To decide what needs to be done, the employee:

- reviews existing relevant laws and agency fish and riparian management regulations, policies, and standards;
- examines environmental goals and objectives for protecting fish and riparian areas;
- assesses competing interests of commercial and recreational goals and conservation efforts;
- studies new scientific and technological advances in fish conservation and riparian protection; and
- conducts in-depth analyses of fish and riparian management issues.

Difficulty and Originality Involved – The employee exercises considerable judgment and originality to:

- balance protecting fish and the fish environment against commercial and industrial interests, and recreational uses;
- assess the impact of legislation and technological advances on fish and riparian issues;
- develop solutions to critical and unyielding problems; and
- develop plans for implementing state-of-the art advances in fish and riparian area management.

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LEVEL 4-5: WILDLIFE REFUGE MANAGEMENT SPECIALIST, 0485

Nature of Assignment – Work involves planning and managing programs for a wildlife refuge complex bordering an urban area.

What Needs To Be Done – To decide what needs to be done, the employee considers:

- the many indigenous flora and fauna and threatened species in the areas;
- the potential economic impact of agency actions on commercial interests, individuals, and local governments;
- conflicts between species conservation and recreational interests; and
- highly urbanized, environmentally-degraded condition of refuge watersheds.

Difficulty and Originality Involved – The employee exercises considerable judgment to conceive new strategies for solving problems. Actions are complicated by:

- diversity of stakeholders with conflicting goals and objectives;
- highly controversial and highly politicized projects;
- state and local governments, commercial and industrial entities, and environmental interest group pressures; and
- rapid growth and need for expansion of the transportation, communication, and utilities infrastructure of the nearby urban area.

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FACTOR 5 ILLUSTRATIONS

LEVEL 5-2: SOIL CONSERVATIONIST, 0457

Scope of the Work – Developmental assignments involve:

- applying conservation techniques common to the area; and
- preparing conservation plans for individual land units for which objectives are specific and conservation measures are known to be responsive to the physical land features of the area.

Effect of the Work – Work results affect efficient performance of conservation planning and related efforts by higher-grade employees.

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LEVEL 5-3: RANGELAND MANAGEMENT SPECIALIST, 0454

Scope of the Work – Work involves investigating, analyzing, and resolving a variety of conventional land management resource problems and environmental conditions that:

- occur within a district;
- involve conventional problems, such as riparian degradation, downward trends in ecological site and habitat condition, and range improvement construction and maintenance;
- involve multiple-use rangeland resources; and
- concern grazing on public rangelands and cooperation with range users and interested public interest groups.

Effect of the Work – Work results affect:

- the efficient use, development, and protection of natural resources of public rangelands;
- the cultural and economic activities of land users and the interested public; and
- achieving objectives of segments of the land management program for the district.

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LEVEL 5-3: SOIL SCIENTIST, 0470 (ILLUSTRATION 1)

Scope of the Work – Work involves analyzing and interpreting soil survey data for the general public to plan and use soil and land-related resources.

Effect of the Work – Work results affect:

- resources utilization; and
- local office credibility with soil survey users.

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LEVEL 5-3: SOIL SCIENTIST, 0470 (ILLUSTRATION 2)

Scope of the Work – Work involves conducting an initial study or updating soil survey data. The employee conducts all phases of routine soil survey data collection including mapping, classifying, and investigating.

Effect of the Work – Work results affect the quality of soil survey data collection, which may impact the socioeconomic well-being and safety of the public.

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LEVEL 5-4: RANGELAND MANAGEMENT SPECIALIST, 0454

Scope of the Work – Work involves determining the effectiveness of the direction and goals of rangeland conservation programs.

Effect of the Work – Work results affect:

- the day-to-day field office operations of public land management programs;
- program activities within several assigned states that have several million acres of public land;
- livestock operators; and
- annual animal unit months of forage.

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LEVEL 5-4: FORESTER, 0460

Scope of the Work – Work involves developing policy directives or program materials on:

- forest ecosystem management including forest health, salvage actions, reforestation, timber stand improvement techniques, and harvesting options; and
- silvicultural practices, such as operation of seed orchards, seed extraction and storage, seedling survival, and chemical uses.

Effect of the Work – Work results affect:

- programs that measure and value forestry management and development; and
- the continued existence of forest resources.

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LEVEL 5-4: FISH BIOLOGIST, 0482

Scope of the Work – Work involves:

- intensive investigation of unusual culturing and rearing of fish species for restoration efforts;
- managing habitats to assure perpetuation of endangered or threatened species; and
- evaluating the results of research on fish production and major fish hatchery effectiveness.

Effect of the Work – Work results affect the ability of the agency to accomplish fish production and preservation goals and objectives.

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LEVEL 5-4: WILDLIFE REFUGE MANAGEMENT SPECIALIST, 0485

Scope of the Work – Work involves:

- implementing programs authorized and mandated by wildlife conservation and refuge administration statutes;
- coordinating with other entities to establish refuges; and
- planning and executing refuge public use, maintenance, and law enforcement programs.

Effect of the Work – Work results affect:

- the agency's ability to protect endangered species on refuge lands;
- the public's understanding and appreciation of biological diversity, wildlife resources, and the refuge system; and
- the agency's ability to meet the refuge goals of providing safe and high quality recreation and environmental education programs.

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LEVEL 5-5: ECOLOGIST, 0408

Scope of the Work – Work involves:

- protecting forest and rangeland ecosystems and restoring damaged ecosystems;
- developing and recommending agency-wide program policies, objectives and standards for monitoring and evaluating forest and rangeland conditions; and
- collaborating with other agency staff and with academic, commercial, and public interest organizations to coordinate resource management plans, programs, practices, and results.

Effect of the Work – Work results affect:

- legal, regulatory, and policy parameters and guidelines for aspects of one or more resource programs; and
- the present well-being of local communities.

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LEVEL 5-5: SOIL SCIENTIST, 0470

Scope of the Work – Work involves:

- providing strategic planning, financial management, and direction for the National Cooperative Soil Survey Program;
- developing innovative soil testing techniques; and
- developing policy, technical, and procedural guidelines.

Effect of the Work – Work results affect the:

- credibility of the agency's soil programs;
- timeliness, quality, and acceptance of soil data; and
- quality and consistency of soil research.

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LEVEL 5-5: WILDLIFE REFUGE MANAGEMENT SPECIALIST, 0485

Scope of the Work – Work involves:

- resolving critical problems in habitat administration or manipulation;
- determining the validity and soundness of refuge programs and administration plans;
- developing standards and guides to improve refuge resource use, development, and protection; and
- developing wildlife habitat agreements with stakeholders.

Effect of the Work – Work results affect:

- the establishment and operations of wildlife refuges;
- accomplishing goals for wildlife refuge administration, development, and use; and
- the social and economic well-being of a large number of communities and industries whose interests are related to access to or exploitation of wildlife refuge lands.

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PART III – EXPLANATORY MATERIAL

Key Dates and Milestones

In 1997, the Office of Personnel Management (OPM) notified agencies that we were initiating a project to develop a Job Family Position Classification Standard (JFS) for professional work in the Biological Sciences Group, 0400. Between 1997 and 2000, we conducted fact-finding efforts at 20 installations representing six agencies that collectively employed about 90 percent of the personnel in the professional occupations in the 0400 occupational group. In early 2000, to conform to a policy limiting the annual release of standards, we deferred work on the project.

Our schedule allowed release of the draft JFS in October 2002. Shortly before that release, we designated two agencies, the U.S. Department of Agriculture and the Department of Health and Human Services as lead agencies. We required that lead agencies test apply the draft standards. In addition to the lead agencies, we invited and encouraged all agencies to comment on the draft. This Part addresses concerns expressed by reviewing agencies and describes our responses to them. It also provides information that may help agencies to manage transition from cancelled occupational standards to this JFS.

Another important milestone is that many Federal “white collar” positions are no longer evaluated by the General Schedule grading criteria. In recognition of this situation, OPM now defines series without a prefix of GS (e.g., series GS-0401 is now shown as 0401). We have also changed the format of this JFS to support those users who do not classify positions according to the General Schedule. Part I contains occupational information that is applicable to Federal work covered by the JFS without regard to pay plan or classification system. Part II provides grading information for positions classified according to the General Schedule grade definitions in chapter 51 of title 5, United States Code. Part III explains the development of this standard.

Results of Agency Review, Comment, and Test Application

Agency test applications of the JFS showed that the standard had no significant grade impact. The agency reviews, however, recommended a number of changes. Some recommendations involved minor editorial items, while others concerned major issues. We describe below our responses to major issues.

A. JOB FAMILY STANDARD – GENERAL INFORMATION. During the development of this job family standard (JFS), we exploited every opportunity for simplifying and streamlining its content. We relied heavily on the help of agency subject-matter experts and human resources management officials to do this. We also incorporated changes into this JFS based on lessons we learned from our work on earlier JFS issuances.

1. Name Changes. We changed the suggested name of the occupational group from “Natural Sciences Group” to “Natural Resources Management and Biological Sciences Group.” We made this change to reflect broad agency recognition of astronomy, chemistry, physics, and other biological work as scientific in nature. The words, “natural resources management,” in the name reflect the rangeland and forest management occupational content. “Natural resources management” is first in the name because that work characterizes the majority of the positions in the group. We put the words, “Biological Sciences” in the name because of the biology, microbiology, genetics, and other biological science occupational content.

2. Distinguishing Between Professional and Technical Work. In response to the draft of this JFS and earlier standards, agencies requested that we provide guidance on classification issues related and perhaps unique to professional scientific work. One specific request was that we provide guidance on distinguishing between professional and technical work. The guidance is available in “The Classifier’s Handbook” and, as a convenience for the agencies, we have incorporated the guidance into this JFS.

3. Functional Classification Codes. We require agencies to submit a functional classification code to the Central Personnel Data File for each position in an occupation covered by this JFS. The code definitions and instructions for assigning them are in “The Guide to Personnel Data Standards.” For the convenience of the reader, this JFS provides a list of functional classification codes and a hypertext link to the code definitions and code assignment instructions.

B. THE 0400 JOB FAMILY STANDARD FOR PROFESSIONAL WORK – SPECIFIC ISSUES. When we announced this study, we requested agency comments on a number of specific issues. This section describes those issues and provides a summary of the agency comments on them. It also describes the actions we have taken in response to the agency comments, and the rationale for our actions.

1. Management Criteria

The October 2002 draft included criteria for defining managerial positions. Some agencies expressed concern with the adequacy of the criteria.

As managerial criteria would not be specific to the 0400 group, we deferred action in favor of a separate project to address the issue on a classification system-wide basis. We deleted the managerial criteria from the JFS for this reason.

2. Abbreviated Narrative Descriptions of Occupations

Several agencies submitted text to supplement or replace the narrative occupational descriptions in the draft. The submitting agencies typically expressed concern that the draft’s narrative descriptions of occupational duties were not comprehensive or detailed enough to provide a true picture of occupational duties.

One goal of occupational narratives is to give the reader enough information, over and above the series definitions, to make distinctions between closely related series. We believe the “abbreviated” occupational descriptions meet this need by focusing on the usually few, but unique, characteristics that define an occupation separately from others.

3. Series 0401: Use for Fire Program Management and Recreation Science

The U.S. Department of Agriculture (USDA) and the Department of the Interior (DOI) requested the establishment of new occupations for fire program management and recreation science, respectively. Alternatively, they asked that we establish fire program management and recreation science as options under the General Natural Resources Management and Biological Sciences Series, 0401.

In discussions with USDA and DOI, we noted that if employees were placed in fire program management and recreation science occupations, those employees might have difficulty qualifying for positions in other 0400 professional occupations. Both USDA and DOI wanted the flexibility to move personnel into and out of the fire program and recreation science activities. Accordingly, they agreed to use the 0401 series for the two activities.

We instruct agencies to use series 0401 when work of a position matches work of the occupational group, but does not match any occupation in the group. To meet agencies needs, we have added narrative descriptions of fire program management and recreation science (which we refer to as recreation management) to the description of the 0400 occupational group. Agencies that have fire program management and recreation science work that matches the work of the 0400 occupational group will not find a matching occupation in the group. By default, agencies may classify the work to series 0401.

The work of the Outdoor Recreation and Planning Series, 0023, resembles closely the work of recreation management that we describe as applicable to the 0400 group. The “Additional Occupational Considerations” section of this standard distinguishes between these occupations.

4. Series 0406, Agricultural Extension Service Series, and 0493, Home Economics Series: Series Cancelled

We cancelled the Agricultural Extension Service Series, 0406, and the Home Economics Series, 0493, because of no or low employee populations. As of December 31, 2003, series 0406 had no GS employees; series 0493 had 10. The 10 series 0493 employees may be more appropriately classified to the Dietitian and Nutritionist Series, 0630, or the General Health Science Series, 0601.

5. Series 0430, Botany; Series 0434, Plant Pathology; Series 0435, Plant Physiology Series: Canceling Proposed Consolidation

Agencies and some stakeholders commented that each of these occupations has unique educational requirements, involves different work experiences and participates in different professional organizations, and must have a comprehensive and in-depth knowledge of different professional literature. They forcefully objected to consolidation. As we do not see any significant benefits arising from the consolidation, we acceded to agencies requests and cancelled the consolidation.

6. Series 0436, Plant Protection and Quarantine: Series Cancelled

We have cancelled the Plant Protection and Quarantine Series, 0436. For many years, series 0436 was a single agency (USDA) series with about 2,200 personnel. 1,500 of the 0436 personnel transferred to the Department of Homeland Security (DHS) and were classified to other series. The remaining positions will be classified to 0401, General Natural Resources Management and Biological Sciences.

7. Series 0454, Rangeland Management: Occupation Name and Position Titles Remain Unchanged

The October 2002 draft changed the name of the occupation, 0454, from “Rangeland Management” to “Rangeland Conservation.” The draft also changed the official position title for the occupation, from “Rangeland Management Specialist” to “Rangeland Conservationist.” Series 0454 is a single agency series and the relevant agency commented that it wished to retain the existing occupational name and position titles.

We made these changes in the October 2002 draft to be consistent with the proposed definitions of manager and management in that draft. As mentioned in Item 4, above, we have deleted the manager and management criteria from the draft. When we removed those criteria from the standard, we lost the primary justification for the title changes. Accordingly, we have retained the original titles.

8. Series 0480, “General Fish and Wildlife Administration” renamed to “Fish and Wildlife Administration”

We deleted the word, “General,” as serving no useful purpose.

9. Series 0480, Fish and Wildlife Administration; 0482, Fish Biology; 0486, Wildlife Biology: Canceling Proposed Consolidation

See the discussion in #5 above.

10. Fishery Biology Series, 0482 Name Change

We changed the name of the Fishery Biology Series, 0482, to the Fish Biology Series, 0482, to make the name consistent with common usage.

11. Addressing Consumer Product Test and Evaluation Work

Some agencies commented that the job family standard lacks criteria for evaluating grade levels of positions engaged primarily in testing and evaluating consumer products for safety and other concerns. We note that none of the existing occupational standards in the 0400 group provide grade level criteria for test and evaluation work.

The Grade Level Guide for Test and Evaluation Work in Engineering and Science Occupations provides criteria for the test and evaluation functions. Guide coverage is limited to work in the Engineering and Architecture Group, 0800, and the Physical Sciences Group, 1300. While the Guide does not address test and evaluation work outside the 0800 and 1300 groups, cross reference to the Guide may be appropriate for grading 0400 positions.

12. Grade Evaluation Criteria for Regulatory Work

Some agencies commented that the job family standard did not address adequately, for grade evaluation purposes, work that involves primarily writing regulations. The “Grade Evaluation Guide for Policy Analysis” provides grading criteria for that type of work. Use of the Guide may be appropriate for classifying the work identified by these agencies, but the Guide cautions the reader to distinguish between actually developing and writing policies and regulations versus providing expert advice to others who may perform these tasks. Use of the Guide is applicable only for the former positions. This JFS provides in Factor Levels 6, Personal Contacts, and Factor 7, Purpose of Contact, the criteria for recognizing for grade evaluation purposes the rendering of “expert advice.”

13. Distinctions Between Factor Levels in Factor 1, Knowledge Required by the Position

Some agencies commented that they had difficulty distinguishing between Factor Levels 1-7 and 1-8. In response, we revised the factor level criteria.

14. Illustrations Inconsistent with Factor Levels

Agencies pointed out several inconsistencies between criteria at given factor levels and the illustrations that we provided to affect a better understanding of the criteria. We revised both criteria and illustrations to eliminate those inconsistencies.

15. Illustrations

Many agencies commented on the absence of illustrations for several of the 0400 occupations. The agencies also commented on spotty illustration coverage for the factor levels of various occupations.

Illustrations in the standard assist the reader in distinguishing between factor levels when the distinctions are not evident from the factor level descriptions themselves. We remind users that illustrations are merely examples. The factor level descriptors provide the grading criteria needed to evaluate the grade level of positions.

16. Deletion of Glossary

Several agencies commented that the glossary was not complete and/or that some definitions were not accurate. In the “print world,” the glossary provided a convenient means to find the meaning of unfamiliar scientific terms that we used in the JFS. Since one may now easily find current usage of scientific terms via the Internet, we have decided that a JFS glossary is not necessary.