

Applicant #: _____

Question # _____

Answer on these pages, tear from the booklet and submit with the answer

packet if you chose Option A for Part I of this examination.

Professional Foresters Registration Examination, April, 2019

PART I

Instructions: APPLICANTS, PLEASE READ THESE INSTRUCTIONS CAREFULLY. You MAY complete PART I by doing ONE of the following two options:

A) Complete the Short Answer Section (Question 1) and Any Two (2) of the Essay Questions (Questions II through V)

OR

B) Complete Any Three of the Essay Questions (Questions II through V) and OMIT answering the Short Answer Question (Question I).

Question II - Forest Mensuration

Question III - Forest Ecology

Question IV-Silviculture

Question V - Forest Protection

Professional Foresters Registration
1416 9th Street, Room 1506-16
Sacramento, CA 95814

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ACRONYMS AND ABBREVIATIONS USED IN THIS EXAMINATION

The following Acronyms and /or Abbreviations **may be used** in this examination.

Technical abbreviations that should be known by a forester are NOT included here (e.g. DBH, MAI, MBF). You may remove this page for reference throughout this examination. **It need not be returned.**

<u>Acronym or Abbreviation</u>	<u>Full Text</u>
BLM	Bureau of Land Management, USDI
BOF	California State Board of Forestry and Fire Protection
CA	California
CCR	California Code of Regulations
CAL FIRE	California Dept. of Forestry and Fire Protection
CDF&W	California Department of Fish and Wildlife
FPR	California Forest Practice Rules
PRC	California Public Resources Code
RPF	California Registered Professional Forester
THP	California Timber Harvest Plan
TPZ	California Timber Production Zone
USFS	United States Forest Service, USDA

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April 2019 RPF EXAMINATION

3% 1. The process by which a landscape is broken into small islands of forest within a mosaic of other forms of land use or ownership is known as:

3% 2. An **Ecosystem** can generally be defined as:

3% 3. Describe the difference between litter and humus.

3% 4. Define the term: **marginal revenue**.

3% 5. A cost that changes in response to the level of output is what type of cost?

3% 6. You wish to thin a stand of trees to an average 18 ft. x 18 ft. square spacing. How many trees per acre would your thinned stand have on the average acre? Show your work.

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3% 7. Name **three (3)** retention practices recommended for stand treatments to maintain options for Northern spotted owls on timberlands?

3% 8. In forest fires and other larger public emergencies within the US, a particular organizational system is used to manage the facilities, personnel, participating organizations, equipment and other resources to meet the needs of the emergency. Name this organizational system. (Do not abbreviate)

2% 9. As used in Forest Protection, what is a **conk**?

3% 10. As used in Forest Protection, what is a **Parasite**?

3% 11. Utilization of forest biomass for bioenergy can benefit the people of California in several ways. List three (3) **major public** benefits.

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3% 12. Explain the impetus (main reason) for California changing to the Yield Tax on timber in 1976?

3% 13. Consider two 55-year old California commercial conifer stands, both similar in most respects (site, topography, soils, species, successful planting origin, fire and pest effects, etc.). One stand was thinned from below twice, 35 Years ago (biomass) and 15 years ago (commercial thin). The other stand had no intermediate treatments. Which stand will likely have the greater standing cubic volume of wood?

4% 14. According to the definitions in the FPR (CCR 895.1), what stream order is required for a planning watershed and generally what is the maximum acreage for a planning watershed?

3% 15. As applied to the growth of an even-aged stand of trees, what is the term for the point where the volumetric MAI is greater than zero and equal to the volumetric PAI?

3% 16. What are the three (3) primary stand management factors controlling the regeneration process (proportion of stand area regenerated per entry and number of gaps created) when utilizing Group Selection Silviculture?

4% 17. What is a **Prescribed Fire**?

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3% 18. As used in the FPRs, what is the **Road Prism**?

3% 19. List three (3) situations which may occur during field variable plot cruising, when is it important to know the plot radius factor.

3% 20. Define a **bone-dry ton**.

3% 21. As used in Silviculture, what is **forest succession**?

3% 22. In log scaling, describe what is meant by a **diagram rule**?

3% 23. As used in Mensuration, what is **Stratified Random Sampling**?

3% 24. Define the following Financial decision method used for Forest Management Decisions: **Land Expectation Value (LEV)** aka (**Faustman formula**).

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3% 25. As used in Forest Engineering, what is an **Interlocking Yarder?**

3% 26. How do the FPRs define a **Critical Dip** as used on logging roads?

3% 27. Define the following Financial decision method used for Forest Management Decisions: **Internal Rate of Return (IRR).**

3% 28. What is a **climax forest?**

3% 29. According to the CAL FIRE guidance concerning large old trees, what is the smallest stand size area that must be disclosed in a THP when large old trees are present and potential significant adverse impacts pertaining to large old trees may occur?

2% 30. A nine-digit code (e.g.1170.40606) that uniquely identifies any of the drainage basins in the United States in a nested arrangement from largest (Regions) to smallest (Cataloging Units) is called a

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3% 31. What is the biological foundation (characteristic of a tree species or population that allows) for Tree Improvement?

3% 32. The achievement and maintenance in perpetuity of annual or regular periodic output of various renewable resources without impairment of the productivity of the land is termed:

4% 33. List four (4) terms are used to define "taking" under the Federal Endangered Species Act?

END OF QUESTION # 1

QUESTION II - FOREST MENSURATION

OBJECTIVE

To demonstrate your knowledge regarding computerized growth simulators.

SITUATION

Computerized growth and yield stand simulators have become increasingly sophisticated, user friendly and affordable tools to determine sustainable management options.

QUESTIONS

20% 1. What is a growth/stand simulator? List three (3) specific mensurational or forest management uses for growth/stand simulators. Why has the forestry profession has seen the great growth in the number and use of these simulators?

15% 2. Define and compare these three types of simulators
A. Individual-tree, distance-independent
B. Individual-tree, distance-dependent, and
C. Whole Stand

3. Shown below are the Acronyms of several Forest Growth Simulators COMMONLY used in the western U.S. or Western Canada:

- I. CACTOS
- II. CRYPTOS
- III. FVS (variant ??)
- IV. ORGANON
- V. FPS
- VI. DFSIM
- VII. PPSIM
- VIII. FORECAST

Pick any ONE (1) Simulator and answer the following questions:

15% A. Define the complete title of the Simulator you have chosen to discuss. (E.g.- What does the acronym stand for?). Who or what organization developed the simulator.

50% B. Discuss how the simulator is utilized including appropriate species, the geographic range of the original data, what data ranges are most appropriate and general information about what data is necessary to execute the simulator. (If you are using FVS be certain to state which variant you are discussing).

END OF QUESTION

QUESTION III-FOREST ECOLOGY

OBJECTIVE:

To demonstrate understanding of ecological principles and their application to forest management.

QUESTIONS:

- 5% 1. What is an **ecosystem**?
- 5% 2. What is **forest succession**?
- 10% 3. What **causes** forest succession? Briefly describe the **process** of succession.
- 20% 4. What is a **disturbance-recovery regime**? Name **five (5) natural** (primarily non-human caused) and **three (3) anthropogenic** disturbance-recovery regimes that have affected western forests in the USA. Why are disturbance-recovery regimes important?
- 5% 5. What is **biological diversity**?
- 5% 6. How is **biological diversity described or measured**?

SITUATION for questions 7, 8, 9 and 10

Hypothesize a **50-year old** California forest stand on good timber site **of your choosing** which has been **managed for commercial wood production since its inception**.

- 15% 7. Describe your stand in both **abiotic** and **vegetative** terms. Please be both thorough and well organized.
- 10% 8. Describe your stand **history** in **terms of disturbance and succession**.
- 5% 9. Describe the **vegetative biological diversity** of your 50-year old stand.
- 10% 10. What **changes** in forest management (**do not** consider a change in the basic beginning condition (tree regeneration strategy) of your stand) might have been done shortly before and **after the time of your stand inception** and **over the past 50 years** to **increase biological diversity** over the life of the stand while retaining the basic timber production objective?
- 10% 11. Why is it **not** sufficient to manage for biological diversity at the stand level alone?

End of Question and Answer

QUESTION IV FOREST SILVICULTURE

OBJECTIVE:

To demonstrate understanding of silviculture principles and their application to managed stands.

SETTING:

The timberland of California.

QUESTIONS:

5% 1. What is **silviculture**?

5% 2. What are **silvics**?

90% 3. Discuss the silvics of major California commercial species. Please use the two (2) matrices below to provide your answer.

You must select three (3) species in each matrix. Write the chosen species names at the top of each matrix.

In matrix # 1 select three (3) from among: Pinus ponderosa (CA), Pseudotsuga menziesii (CA), Abies concolor (CA), and Sequoia sempervirens.

In matrix # 2 select three (3) from among: Notholithocarpus (formerly Lithocarpus) densiflorus, Calocedrus decurrens, Pinus contorta murrayana CA, and Quercus kelloggii.

You must turn in one copy of each matrix with exam answers.

Answer Matrices on the next Two pages

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MATRIX # 1

Silvics	Species	Species	Species
Age or size to begin good seed production			
Good seed crop frequency			
Ave % sound seed			
Seed spread distance			
Best seedbed			
Seed Regen success			
Establish best in shade or sun from seed?			
Sprouter?			
Grows best in full/partial shade/ sun?			
Survives well under shade?			
Responds to release well?			
Sensitivity to stand density low -high?			
Most damaging pests			
Stem damage potential			
Genetic variability or hybrids			

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MATRIX # 2

Silvics	Species	Species	Species
Age or size to begin good seed production			
Good seed crop frequency			
Ave % sound seed			
Seed spread distance			
Best seedbed			
Seed Regen success			
Establishes best in shade or sun			
Sprouter?			
Grows best in full or partial shade or sun?			
Survives under shade?			
Responds to release well?			
Sensitivity to stand density low -high?			
Most damaging pests			
Stem damage potential			
Genetic variability or hybrids			

End of Question

QUESTION V- FOREST PROTECTION

OBJECTIVE

To demonstrate knowledge of the role and effects of insects and diseases in forest stands.

QUESTIONS

40% 1. Discuss **four (4)** major ecological roles/effects of insects in forest ecosystems. Give examples for each.

20% 2. Annosus root rot has become more widespread and abundant in partially cut stands in California. Describe how it spreads and mitigations for prevention and control.

20% 3. Name the most important disease of sugar pine and western white pine in California. Discuss the life cycle and dynamics of this disease including environmental and biological interactions. You may draw a chart or table to aid your discussion.

20% 4. Early logging practices in the mixed conifer forests of the Sierra Nevada were highly selective for pines and many entries were made over time. Discuss what affect this logging had on the complex of insects and disease-causing pathogens in these forests that is apparent today.

END OF QUESTION

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Part II

**Applicant Must Also Answer Three (3) of the Remaining
Five Essay Questions in Part II**

Question VI-Forest Engineering
Question VII-Economics
Question VIII-Forest Administration
Question IX-Forest Policy
Question X-Forest Management

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QUESTION VI-FOREST ENGINEERING

OBJECTIVE:

To demonstrate ability to independently develop THP preharvest information.

SITUATION:

As a newly licensed RPF, you meet with your first client. She requests you prepare a plan to harvest her quarter section of timberland in the Northern forest district. She has no prior experience with timber harvesting, but the recent drought and a small lightning strike fire last fall has her concerned. She wants to become knowledgeable about forest management and harvesting. She provides ownership documentation and you agree to be her RPF for both plan development and advice during the plan operations.

After some office research and an initial brief site visit you meet again. You describe her property as a Southwest facing moderate slope area at 3,500 to 4,500-foot elevation extending from a main West – East trending ridge down through several mid slope benches to a Class I stream. The granitic soils are good site II, well but irregularly stocked with mixed conifer and hardwood young growth sawtimber. There are several springs originating class II watercourses. Access is good with existing ranch style roads that will require reconstruction for logging use.

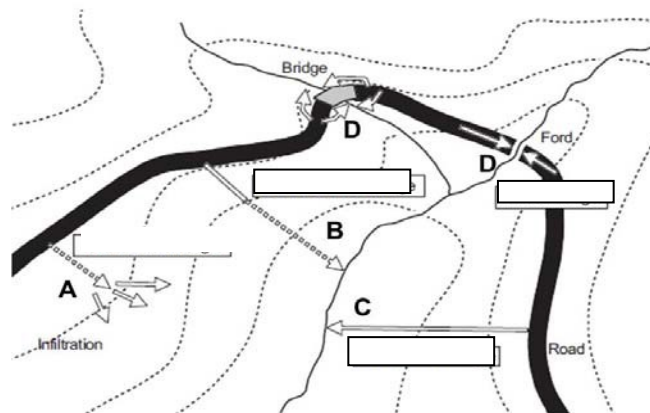
You begin to explain the THP planning process. Your landowner has several questions during the explanation.

QUESTIONS:

20% 1. You indicate that while the existing roads are well located for timber harvesting, they are inadequate for log truck traffic and must be reconstructed. Fortunately, the side slope (<40%) and road grades < 15%) are not steep. However, the roads are hydrologically connected and exhibit one potentially significant erosion site.

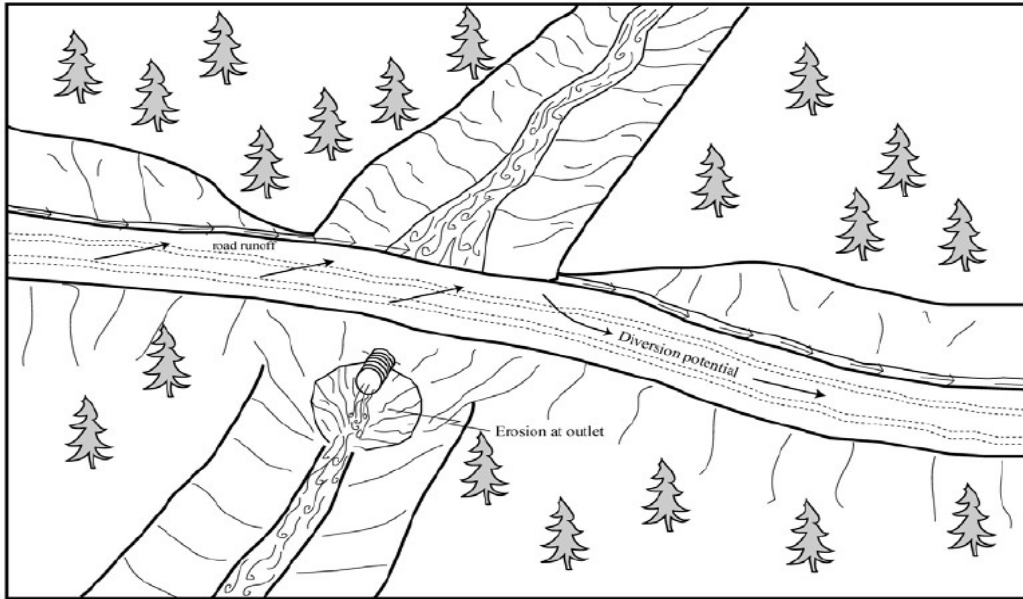
She asks you to explain **why hydrologic connection is bad.**

15% 2. You show her the diagram below. She asks you to explain the areas of potential connectivity A, B, C and D (2). \Rightarrow Indicate sediment flow, dashed arrows indicate partial sediment flow.



CONTINUED NEXT PAGE

- 5% 3. She asks you to explain what a Significant Sediment Discharge is.
- 5% 4. She asks you to explain what a significant existing or potentially significant erosion site is.
- 10% 5. She expresses concern about the potentially significant erosion site at the road. She asks: "What was the process you used to discover this **road erosion** problem?"
- 15% 6. She expresses concern about the Class II watercourse crossing where the potentially significant erosion site is located. You show her the following diagram. Indicate two (2) primary potential erosion locations and describe the type of reconstruction needed to eliminate the hydrologic connection. Explain why they are needed. You may use the diagram to indicate location.



- 15% 7. She asks: "What were the key factors you used to develop the necessary treatments?"
- 15% 8. She expresses concern about the condition of her existing roads and asks you to explain the general guidelines you will use to design the reconstruction of roads.

END of QUESTION

QUESTION VII-FOREST ECONOMICS

OBJECTIVE

To demonstrate your understanding of basic economic theory as it applies to forest products and markets.

SITUATION

Log and lumber markets can sometimes change significantly over short periods of time. The following is an example of one such change.

The general US recession (circa 2008-2010) led to some of the worst conditions for the forest products industry since the end of World War II. However, from January through April 2010, the price of Douglas-fir and other framing/construction lumber spiked higher. An example of prices (from the publication, "Random Lengths-July 7, 2010) during this period is shown below:

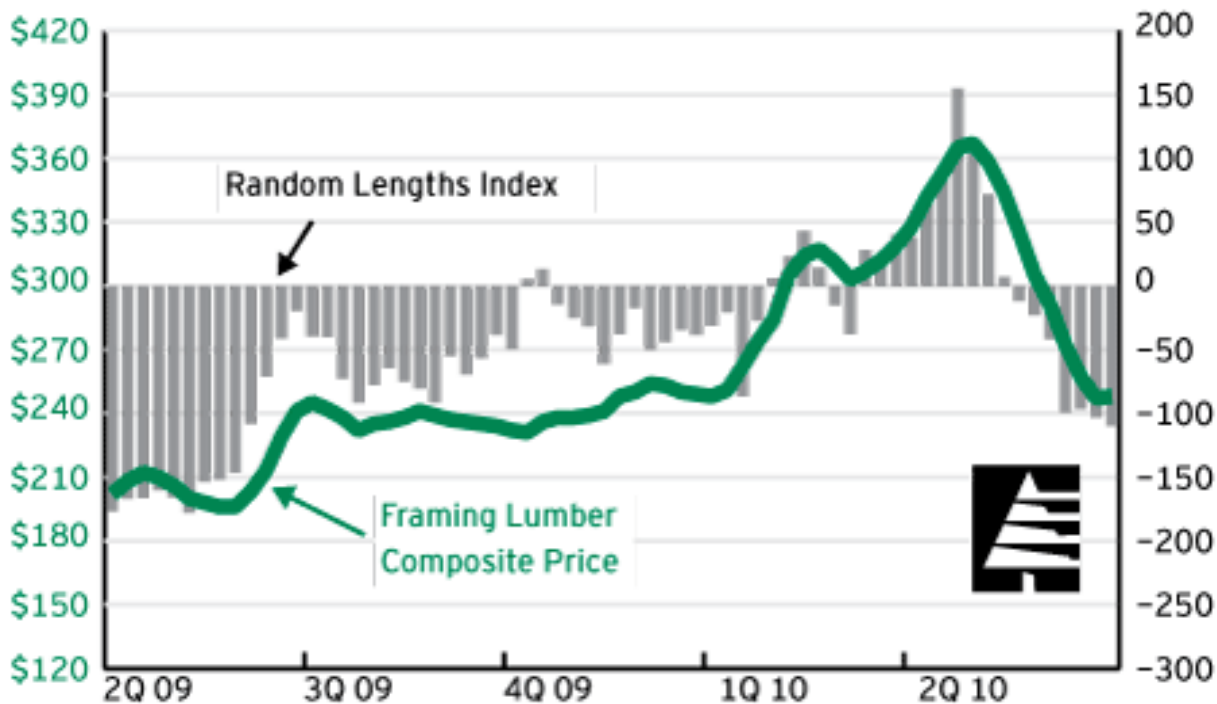


Figure 1: From the Random Lengths July 7, 2010 Weekly Snapshot. The Random Lengths Framing Lumber Composite Price is an aggregated price for all species used in the framing lumber category (in the western U.S. is primarily Douglas-fir). The Random Lengths Index is a relative index of prices based on a baseline value.)

In the first and second quarters of 2010, framing lumber reached a price higher than any month since May of 2006. Housing starts and other economic activity marginally increased over 2009, but were still roughly a third of what they were in 2006. However, by June of 2010, the lumber and log markets returned to about where they were prior to the price spike.

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QUESTIONS

20% 1. What types of events can affect short-term behavior in the Western US Douglas-fir log and lumber market. You need not refer specifically to the example given above. How sensitive is the Western US Douglas-fir log and lumber market to such events?

30% 2. Explain the relationship of changes in price and harvest volume in terms of simple economic concepts. Draw one graph showing the relationship of price, harvest volume (supply) and demand that reflects conditions both before and after changes occur. Be sure to label your graph.

20% 3. In addition to new home construction, briefly describe two (2) other major domestic markets that utilize or consume dimension lumber.

30% 4. Discuss how changes (increase and decrease) in stumpage price in California might affect:
a. log imports/exports
b. non-wood building materials
c. land use, land management and environmental concerns

END OF QUESTION

QUESTION VIII- FOREST ADMINISTRATION

OBJECTIVE

To demonstrate the applicant's general understanding of timber and timberland taxation policy in California.

SITUATION

As a RPF, you have been contacted by a newspaper journalist who is writing an article on State taxation of timber and timberlands in California. You want the story to be written accurately and attempt to answer her questions, while keeping the jargon and technicality to a minimum. Her questions are as follows:

QUESTIONS

20% 1. Explain how the State taxation of timber and timberland in California generally works? I would like to know the appropriate law(s) that govern this area. Please clearly define any terms, concepts, and acronyms that you use.

20% 2. What was the public interest policy objective of the creation of this current method of State taxation of timber and timberland? Why not just tax timber and timberland like a home or shopping mall? Which agencies are involved in administering and collecting timber and timberland taxes?

15% 3. Briefly list three (3) advantages that this method of timber and timberland taxation has for the owner, or general public, or both the owner and the public?

15% 4. Are there any disadvantages to the owner and general public? I'd like to have a balanced view, so briefly list three (3) disadvantages.

15% 5. Is there a way for a forest landowner to opt out of this method of taxation? Suppose s/he wants to build a subdivision on the land? Can s/he do it right away? Are there financial consequences?

15% 6. Briefly tell me how would the Yield Tax liability on cut timber differs if the owner sells timber as cut logs which he delivers to the mill or if he makes a lump sum sale to the mill of the timber to be cut?

END OF QUESTION

QUESTION IX- FOREST POLICY

OBJECTIVE

To demonstrate your knowledge of the policies, privileges and responsibilities granted under the California Professional Foresters Law, Forest Practice Rules and Forest Practice Act.

SITUATION

Assume that you are a California Registered Professional Forester (RPF).

QUESTIONS

6% 1. A. Briefly describe the three (3) qualifications an applicant must meet to qualify for application and licensing as a Registered Professional Forester in California.

4% B. Under the Professional Foresters Law, name two (2) actions that are declared unlawful for any person who is NOT a RPF?

10% C. As a RPF what is your legal responsibility relating to the contents and implementation of a Timber Harvesting Plan written by you?

10% 2. A. A Licensed Timber Operator (LTO) logs a 50-acre parcel of timberland with a valid Timber Harvest Plan (THP). The LTO is also the plan submitter and timberland owner. The LTO completes the work satisfactorily but fails to restock adequately in the prescribed time.

Briefly list and explain the corrective steps that CALFIRE may take, assuming that the LTO refuses to do any planting?

20% 2. B. As a Cal Fire RPF you are inspecting operations conducted under an approved THP. During an inspection you find skidding across a Class II stream in several locations in violation of the THP specifications.

Briefly discuss three (3) actions that the CALFIRE may take, from less serious to most serious, to stop the damage.

15% 3. A RPF signs a THP prepared by his apprentice, who has a forestry degree, without the RPF ever visiting the site. The RPF believes the area is not erosion-prone with no class I, II, or IV streams in the THP area and a selection harvest is proposed. The RPF believes his apprentice has adequate experience to do the fieldwork and prepare the THP.

Discuss the RPF's level of responsibility and whether he would perform an illegal act by signing the plan under these circumstances.

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- 15% 4. A RPF retains a wildlife biologist's service in preparing a THP, with his client's permission. The RPF pays the biologist for his work. The RPF then adds a 20% charge to the biologist's fee on to his bill for the client.

Discuss whether the RPF might be guilty of any violations of the Professional Foresters Law.

- 20% 5. For this question, assume an RPF is also a Licensed Timber Operator. He buys timber from small non-industrial timberland owners. One of his marketing points in "closing the deal" to buy their timber is that he can do the THP as well as the logging, saving the landowner on the expense of preparing a THP, and hence give them a better price for their timber. In addition, he tells the timberland owners that since he will also be the LTO, he will be supervising the logging and that improves quality and compliance with the Forest Practice Act and this arrangement lets him give the timberland owners a better price.

- A. Discuss whether this is a criminal act and the validity of this approach as it relates to the best interest of the landowner.
- B. Describe the steps that you would take to head-off any problems if you were faced with a similar situation.

END OF QUESTION

QUESTION X- FOREST MANAGEMENT

OBJECTIVE:

To demonstrate understanding of dry, frequent fire adapted forests in California relative to modern pressures on forest health and long-term carbon dynamics.

SETTING:

The timberland of California interior forests.

QUESTIONS:

- 10% 1. It is widely recognized that fire has a major historic and evolutionary ecological influence on western dry forests. What changes have occurred in composition, structure and function of current western dry forests that have been subject to 20th century fire management, harvesting practices and climate change?
- 20% 2. Describe the basic forest carbon cycle. Include wildland fire in your description.
- 10% 3. Compare the quantity and quality of forest carbon pools in current low- to mid-elevation dry mixed and coniferous forests where wildfire has been effectively excluded, to pre 1850 historic forest conditions.
- 5% 4. What has been the trend in California forests carbon stocks during this 21st century?
- 15% 5. What are the results of intense forest wildfire on public health and carbon stocks? How is this likely to change as climate changes over this 21st century?
- 5% 6. Compare the long-term carbon storage of two otherwise similar stands, one normally stocked and untreated, the other well managed for fire resilience and high-quality timber?
- 5% 7. What are the general objectives of forest fuel treatments?
- 5% 8. What are the desired effects on carbon stocks over time of forest fuel treatments?
- 10% 9. What are the general effects of sawtimber harvesting on forest carbon sequestration?
- 15% 10. List five (5) major policy recommendations that might support carbon stability in the face of increasing wildfire, pest complexes and climate.

End of Question

END OF EXAM