"SOME ECONOMIC ASPECTS OF FARM FORESTRY"

(IN THE COASTAL DOUGLAS-FIR TYPE OF SONOMA AND MENDOCINO COUNTIES OF CALIFORNIA)

By

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Bachelor of Science
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Approved:

[Signature]
Professor of Forestry
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In an article written recently by John F. Preston (1), retired Chief of the Forestry Division, Soil Conservation Service, he states:

"According to the Forest Resource Appraisal of The American Forestry Association, 3,300,000 farmers today own 30 percent of the commercial forest land in the country. Yet only one out of ten is applying the principles of good forestry management to his woodlands. This despite the fact that federal and state forest agencies have been trying to sell forestry to the farmer for 20 years."

In this report the author attempts to show some economic reasons why the practice of forestry may not always appeal to the farmer, even though the growing of trees may appear to be the best use to which the land may be put. The data gathered here is based on only one ranch, but it is believed that it presents a fair representation of the farm wood-lot situation in the coastal Douglas-fir type of Sonoma and Mendocino Counties of California.
II. PROPERTY CHOSEN FOR STUDY

The property of Edward F. Mohrhardt of Cazerdaro, California, was chosen for the purpose of this study for three basic reasons: (1) This ranch, in the opinion of local, state and federal forest service agencies, is typical of a ranching enterprise in the Coastal Douglas-fir type; (2) the owner has entered into a farm forestry agreement with the Soil Conservation Service, and much data obtained by this agency were available to the author; (3) the owner, unlike many of the ranchers in this area, is a well educated and cooperative farmer and is making every effort to convert his somewhat marginal ranch into a paying business enterprise.
III. GENERAL DESCRIPTION OF RANCH PROPERTIES

(A) LOCATION:

This ranch of approximately 3300 acres is about five miles long and averages approximately one mile in width. The ranch is laid out in a general northwest direction. The lower southeast corner is approximately one mile from Cazerdaro, a small resort town and community center, which lies nine miles north of the Russian River in Sonoma County, California, as shown on the Map (Figure I in Appendix).

(B) SOIL COVER TYPES:

Of the 3300 acres included in this ownership, 1500 acres are classified as grazing land. A coniferous timber type covers approximately 1150 acres. The remaining 350 acres consists of a mixture of hardwoods and brush.

1. Grazing Lands. The 1500 acres of grazing land on this ranch are confined to the ridge tops and more gentle slopes. Of the total, about 700 acres can be classified as open grazing land, the remainder being in wooded pasture. That severe overgrazing has been practiced in the past is evidenced by the abundance of the less palatable grasses and weeds. Numerous areas can also be noted where the lack of sufficient vegetative cover has resulted in severe sheet erosion.

2. Timbered Areas. Except for approximately 150 acres in scattered patches of coast redwood, the coniferous timbered areas are composed entirely of second-growth Douglas-fir. This is found to be about seventy years of age, moderately stocked on average to poor sites. A very light scattering of old growth trees is found throughout the stand; the remnants of a logging operation of some seventy years ago. The
presence of charred surfaces on scattered trees is evidence that light fires have passed over parts of stand. Twelve hundred acres of the Douglas-fir are considered accessible and form the basis for this study.

(C) **TOPOGRAPHY:**

The general topography of this ranch is rough and mountainous. The principal ridge runs through the northern portion of the property in a general east-west direction, the slopes of which are cut by deep fingerling canyons. Slopes vary from ten to sixty percent with the majority of the timbered areas on the steeper slopes. Reference is made to the topographic map and the aerial photograph of the property (Figures II and III, respectively, in Appendix).

(D) **CLIMATE:**

The climate of this region is semi-coastal with a high rainfall during the winter. Summers are cool, usually no rain falls from June first to October first. Extremes in temperatures and wind velocities are not considered a major forestry problem in this region.

(E) **IMPROVEMENTS:**

An improved dirt road traverses the length of the property. Although the western three miles of this road is suited to light traffic over all seasons of the year and truck traffic during the dry season, the entire road is unsatisfactory for winter use by logging trucks. A well built farm house and a few ranch buildings are located in the northwestern portion of the property. There is no electric or telephone service available. There are a few fences on the ranch but they are of insufficient quantity to prevent grazing on the timbered areas.

(F) **RANCH INCOME:**

At present the chief income from the ranch is derived from a
beef cattle enterprise, supplemented by $700 per year from a private club for hunting privileges.

The timber on this property has not been considered as a crop. As a large portion of the stand is now in merchantable size classes, the present inclination is to cut off as much as possible for the best stumpage price obtainable. The assumption is that the land can be converted to pasture after the timber has been removed. Three main factors contribute to this line of reasoning: (1) Current high prices for stumpage; (2) fear of fires which might originate from nearby logging operations; and (3) lack of knowledge as to the most economic use of the land.

Past experience in this region has shown that attempts to convert steep timbered slopes into grazing land usually result in a growth of brush of doubtful value, or in devastation of the land through severe sheet erosion. Thus, in hopes of finding some means of encouraging proper land use, the author set out to determine the economics of a timber crop.
IV. DETERMINING THE ECONOMICS OF GROWING TIMBER

(A) INFORMATION AVAILABLE:

The following information was obtained from the owner and the Soil Conservation Service:

1. Aerial photograph of the ranch property.
2. Acreage in the principal cover types.
3. Tally Sheets of a recent extensive cruise of the area.
4. Tax Assessment Values and Rates.

For the purpose of illustration, a topographic map of the area was obtained from the U. S. Geological Survey. It thus remained for the author to obtain growth data and information pertaining to logging and silvicultural practices. Site quality was also obtained, so that some predictions could be made as to the possible productivity of forest areas.

(B) FIELD PROCEDURE:

1. Growth Data. This was obtained by running strips across the principal topography. Measurements were taken of the nearest Douglas-fir encountered at one chain intervals along the strips. Diameter measurements at breast height outside bark were obtained by the use of a diameter tape and recorded to the nearest one-tenth of an inch (Table I, Column 1). An increment boring was then extracted from the tree and the radial growth for the last ten years was measured and recorded to the nearest one-twentieth of an inch (Table I, Column 2). A total of 76 such measurements was recorded. As 1 1/4 inches in D.B.H. is the expected minimum of present utilization, no measurements were taken on trees below this diameter. All trees measured appeared to fall within classes of dominant to co-dominant.
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2. **Site Quality.** This was determined at scattered intervals throughout the stand using a percent Abney and tape to obtain heights of the dominant trees, the age being determined by borings. The average age of the average dominant was found to be approximately seventy years, and the average height approximately 105 feet. By using site index tables constructed by Schumacher (2) the site index was found to be about 80 plus.

(c) **OFFICE PROCEDURE:**

The following steps were followed in compiling the data obtained in the field:

1. **Calculation of Growth Percent:**
   
   (a) The radial growth per tree for the last ten-year period was doubled to obtain the diameter growth (Table I, Column 3).

   This diameter growth was subtracted from the present D.B.H. to obtain the D.B.H. of ten years ago (Column 4, Table I).

   (b) The trees were then grouped into two-inch D.B.H. classes on the basis of their diameters of ten years ago. The average D.B.H. at the beginning of the ten-year period and the average diameter growth during the period were then obtained for each D.B.H. class (Table II).
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<td>1.7</td>
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</tr>
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<tr>
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<td></td>
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<td></td>
<td>18.7</td>
<td>2.4</td>
<td></td>
</tr>
<tr>
<td>G</td>
<td></td>
<td></td>
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<td>18.3</td>
<td>1.2</td>
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</tr>
<tr>
<td>G</td>
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<td></td>
<td></td>
<td></td>
<td>18.3</td>
<td>1.2</td>
<td></td>
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**TOTAL**

<table>
<thead>
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<td>2.0</td>
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<td>1.8</td>
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**TOTAL**

<table>
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<tr>
<th></th>
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<th>12.9</th>
<th>59.2</th>
<th>14.0</th>
<th>63.1</th>
<th>3.5</th>
<th>101.1</th>
<th>5.5</th>
<th>108.1</th>
<th>14.6</th>
<th>107.8</th>
<th>2.9</th>
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<tbody>
<tr>
<td></td>
<td>f</td>
<td>7</td>
<td>7</td>
<td>2</td>
<td>2</td>
<td>2</td>
<td>3</td>
<td>3</td>
<td>3</td>
<td>2</td>
<td>2</td>
<td></td>
</tr>
<tr>
<td>M</td>
<td>M</td>
<td>27.5</td>
<td>1.8</td>
<td>29.6</td>
<td>2.0</td>
<td>31.6</td>
<td>1.8</td>
<td>33.7</td>
<td>1.8</td>
<td>38.0</td>
<td>1.5</td>
<td>55.9</td>
</tr>
</tbody>
</table>

\( D = D.B.H. \) Start of Growth Period  
\( G = \) Diameter Growth During Period  
\( f = \) Frequency  
\( M = \) Average
(c) The total basal area at the beginning and at the end of the ten-year period were then obtained for each D.B.H. class. This determination was made with the use of tables based on areas of circles, Bruce and Shumacher (3). For the purposes of simplification and within the accuracy of this work, the trees were then grouped in broad D.B.H. classes on the basis of their diameter ten years ago (Table III).

(d) The growth rate based on the basal area at the beginning of the ten-year period was then calculated for each broad D.B.H. class as shown in Table III.
## TABLE III

### GROWTH PERCENT

<table>
<thead>
<tr>
<th></th>
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<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
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</tr>
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<tbody>
<tr>
<td>16</td>
<td>7</td>
<td>108.3</td>
<td>15.5</td>
<td>11.3</td>
<td>1.6</td>
<td>1.310</td>
<td>1.595</td>
<td>9.170</td>
<td>11.165</td>
<td>11.165</td>
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<td>18</td>
<td>17</td>
<td>307.3</td>
<td>18.1</td>
<td>35.6</td>
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<td>20.2</td>
<td>2.226</td>
<td>30.379</td>
<td>37.842</td>
<td>37.842</td>
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<td>20</td>
<td>5</td>
<td>99.5</td>
<td>19.9</td>
<td>10.4</td>
<td>2.1</td>
<td>22.0</td>
<td>2.640</td>
<td>10.800</td>
<td>15.200</td>
<td>15.200</td>
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<tr>
<td>Sub-Total</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>59.070</td>
<td>74.150</td>
<td></td>
</tr>
</tbody>
</table>

**GROWTH PERCENT = 2.34 per year**

| 22           | 9              | 200.3                     | 22.3                      | 18.2                      | 2.0                            | 21.3                          | 2.712                     | 3.221       | 21.103                   | 28.989                   |
| 21           | 6              | 115.0                     | 21.2                      | 10.5                      | 1.8                            | 26.0                          | 3.194                     | 3.69        | 19.164                   | 22.110                   |
| 26           | 4              | 106.6                     | 26.6                      | 9.5                       | 2.4                            | 29.0                          | 4.13                      | 4.59        | 15.144                   | 18.36                   |
| 28           | 7              | 192.2                     | 27.5                      | 12.9                      | 1.8                            | 29.3                          | 4.69                      | 5.26        | 22.91                    | 32.65                   |
| Sub-Total    |                |                           |                           |                           |                                |                               |                            | 81.822      | 102.319                  |                           |

**GROWTH PERCENT = 1.64 per year**

| 30           | 2              | 59.2                      | 29.6                      | 4.3                       | 2.0                            | 31.5                          | 5.45                      | 9.55        | 10.90                   |                           |
| 32           | 2              | 63.1                      | 31.6                      | 3.5                       | 1.8                            | 33.1                          | 5.45                      | 6.08        | 10.90                   | 12.16                   |
| 34           | 3              | 101.1                     | 33.7                      | 5.5                       | 1.8                            | 35.5                          | 6.19                      | 6.88        | 18.57                   | 20.61                   |
| 36           | 3              | 108.1                     | 36.0                      | 4.6                       | 1.5                            | 37.5                          | 7.07                      | 7.68        | 21.21                   | 23.01                   |
| Sub-Total    |                |                           |                           |                           |                                |                               |                            | 60.24       | 66.74                    |                           |

**GROWTH PERCENT = 1.08 per year**

| 36 + 2      | 2              | 107.8                     | 53.9                      | 2.9                       | 1.5                            | 55.4                          | 15.84                     | 16.74       | 31.68                   | 33.98                   |

**GROWTH PERCENT = 0.508 per year**

---

**NOTE:** Formula used for calculation of Growth Percent:

\[
\text{Growth Percent Per Year} = \frac{\text{Total B.A. End of Period} - \text{Total B.A. Start of Period}}{\frac{\text{Total B.A. Start of Period}}{\text{Length of Period (years)}}} \times 100
\]
2. Obtaining Volume and Increment Per Acre: The tally sheets of an extensive cruise of the timber were made available by the Extension Forester for the Soil Conservation Service.

(a) With the data obtained from the tally sheets, a stand table was constructed showing the number of trees per acre by D.B.H. classes and the average volume per tree (Table IV, Columns 2 and 3). As most of the trees showing defect were culled in this cruise, these volumes are almost entirely based on sound trees. The average volume of 17,105 bd. ft. per acre was thus determined and the volume in each D.B.H. class was obtained as shown in Table IV, Column 5.

(b) On the assumption that growth for the next ten years will closely approximate the rate of the last ten year period, the percent figures shown in Table III were applied to the volumes of Column 5, Table IV. Thus the average annual increment was found to total 257 bd. ft. per acre (Table IV, Column 6). As this growth is based on volume in sound trees, little loss is expected from disease within the next few years, and the average annual increment will be considered the net increment.
TABLE IV

VOLUMES PER ACRE AND ANNUAL INCREMENT

<table>
<thead>
<tr>
<th>D.B.H. Class</th>
<th>No. of Trees</th>
<th>Average Per Acre Acre Growth %</th>
<th>Average Annual Increment</th>
</tr>
</thead>
<tbody>
<tr>
<td>Inches</td>
<td>Per Acre</td>
<td>bd. ft.</td>
<td>Bd. ft.</td>
</tr>
<tr>
<td>---------------</td>
<td>--------------</td>
<td>-------------------------------</td>
<td>--------------------------</td>
</tr>
<tr>
<td>14-12</td>
<td>25.0 (Poles)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>18</td>
<td>1.02</td>
<td>74</td>
<td>297.48</td>
</tr>
<tr>
<td>16</td>
<td>5.10</td>
<td>133</td>
<td>678.30</td>
</tr>
<tr>
<td>18</td>
<td>5.10</td>
<td>206</td>
<td>1050.60</td>
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<td>20</td>
<td>1.80</td>
<td>281</td>
<td>1348.80</td>
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<tr>
<td></td>
<td></td>
<td>Sub-Total</td>
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</tr>
<tr>
<td>22</td>
<td>5.10</td>
<td>353</td>
<td>1800.30</td>
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<tr>
<td>24</td>
<td>1.71</td>
<td>481</td>
<td>2265.51</td>
</tr>
<tr>
<td>26</td>
<td>3.11</td>
<td>636</td>
<td>1997.01</td>
</tr>
<tr>
<td>28</td>
<td>1.67</td>
<td>805</td>
<td>1344.35</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Sub-Total</td>
<td>7407</td>
</tr>
<tr>
<td>30</td>
<td>1.96</td>
<td>926</td>
<td>1614.96</td>
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<tr>
<td>32</td>
<td>1.08</td>
<td>1045</td>
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<td>34</td>
<td>.29</td>
<td>1292</td>
<td>376.68</td>
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<tr>
<td>36</td>
<td>.88</td>
<td>852</td>
<td>749.76</td>
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<td></td>
<td></td>
<td>Sub-Total</td>
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<tr>
<td>38</td>
<td>.78</td>
<td>11.20</td>
<td>1107.60</td>
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<td>40</td>
<td>1.19</td>
<td>1749</td>
<td>157.11</td>
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<td></td>
<td>Sub-Total</td>
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<td><strong>TOTALS</strong></td>
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<td></td>
<td><strong>17,105</strong></td>
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</table>
(D) ECONOMIC APPRAISAL OF THE STAND:

1. Gross Income From The Annual Increment. According to the best estimate available, based on present selling prices of stumpage in the surrounding area, an average of $2.50 per M.B.F. would be the present expected stumpage price for the Douglas-fir timber on this ranch. Assuming no appreciable increase in quality for the next few years at least, the per acre increment of 257 bd. ft. represents an annual gross income of $0.643.

2. Taxation. This land is assessed under an ad valorem tax at $3.50 per acre for the entire ranch holdings regardless of land use. This assessed value is, however, that of bare land and is the minimum for any taxable land in Sonoma County. The tax rate is $4.78 per $100 of assessed value, which is equivalent to a tax of $0.167 per acre per year.

3. Miscellaneous Costs. Since no effort has been made in respect to the management of this stand, the only charge against the timber is that of taxes.

4. Present Value. The present merchantable value of the timbered areas is the value of the 17,105 board feet per acre or $42.76 plus the value of the bare acre of land, which shall be assumed as the assessed value of cut-over land or $3.50 per acre. This represents a total present value of $46.26 per acre.

5. Interest Rate on Past Investment. For lack of a better figure let it be assumed that the purchase price of the cut-over land seventy years ago was that of the present assessed value of cut-over land, or $3.50 per acre. The assessed value has not fluctuated in the past decade and is thus to be considered a fair figure. The only annual charge against the land is that of taxes which was found to be equivalent to $0.167 per acre. By use of compound interest tables, "Mathematics of
Finance" (4), it was found that the present value represents a compound interest rate between 2 1/4 and 2 1/2 percent on the money which can be considered as having been invested in the present timber crop (Table V, part 2).

6. Interest on Present Investment if the Timber is Held for Future Growth. As was shown above, the present value per acre of the timberland is $46.26. If this timber is to be held for future growth, this present value would represent the initial investment and the annual cost of taxes of $0.167 an annuity chargeable against the stand.

If this timber were to be held for an additional ten-year period, the expected increase in value per acre would be the annual gross income of $0.643 multiplied by ten plus $0.25 for an estimated 100 board from timber now in unmerchantable sizes. This would be a total increase in value of $6.68 per acre. In Table V, Part 3, it is shown that this would represent a compound interest rate on the investment of less than 1 1/2 percent. It will be noted that no increase in value is granted for improvement in quality over this period. This factor is omitted because of current high prices for stumpage. A slight drop in these prices over the next ten-year period could easily compensate for any improvement in quality of the timber.
TABLE V
SUMMARY OF ECONOMIC APPRAISAL

1. Statistics:
   
<table>
<thead>
<tr>
<th>Description</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Average Merchantable Vol. Per Acre</td>
<td>17,105 bd. ft.</td>
</tr>
<tr>
<td>Average Annual Increment Per Acre on the Merchantable Volume</td>
<td>257 bd. ft.</td>
</tr>
<tr>
<td>Expected Stumpage Price Merchantable Volume</td>
<td>$2.50 per M bd. ft.</td>
</tr>
<tr>
<td>Estimated Value of the Land After Present Merchantable Volume Has Been Removed</td>
<td>$3.50 per acre</td>
</tr>
<tr>
<td>Value of Present Merchantable Volume</td>
<td>$42.76 per acre</td>
</tr>
<tr>
<td>Total Present Value of Land and Timber</td>
<td>$46.26 per acre</td>
</tr>
</tbody>
</table>

Taxes:

<table>
<thead>
<tr>
<th>Description</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Assessed Value</td>
<td>$3.50 per acre</td>
</tr>
<tr>
<td>Tax Rate</td>
<td>$4.78 per $100 of Assessed Value (Paid Annually)</td>
</tr>
<tr>
<td>Thus Annual Cost of Taxes</td>
<td>$0.167 per acre</td>
</tr>
</tbody>
</table>

2. Compound Interest on Past Investment:

<table>
<thead>
<tr>
<th>Description</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Initial Investment</td>
<td>$3.50 per acre</td>
</tr>
<tr>
<td>Annual Cost (Taxes)</td>
<td>$0.167 per acre</td>
</tr>
</tbody>
</table>

   Using Compound Interest Tables in "Mathematics Of Finance" (4), the present value of an Initial Investment of $3.50 made seventy years ago plus an annuity of $0.167 is calculated as follows:

   (a) If the interest rate had been 2 1/4 percent, then:

   \[
   \begin{align*}
   3.50 \times 1.7471 & = 6.161 \\
   .167 \times 166.5396 & = 27.81 \\
   \text{Present Value} & = 44.92
   \end{align*}
   \]
TABLE V - Continued

(b) If the interest rate had been $2\frac{1}{2}$ percent, then:

\[
\begin{align*}
3.50 \times 5.6321 &= \$19.71 \\
0.167 \times 185.2841 &= \$30.94 \\
\text{Total} &= \$50.65
\end{align*}
\]

(c) Thus it is observed that the present value per acre of $\$46.26$ represents only a little more than $2 \frac{1}{4}$ percent compound interest on the past investment.

3. Compound Interest on Present Investment if Timber is Held An Additional Ten-Year Period:

<table>
<thead>
<tr>
<th>Present Merchantable Volume Per Acre</th>
<th>17,105 bd. ft.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Expected Increment on Merchantable Volume</td>
<td>2,570 bd. ft.</td>
</tr>
<tr>
<td>Estimated Increase by Inclusion of Some Volumes at Present Classed as Immature</td>
<td>250</td>
</tr>
<tr>
<td>Total Merchantable Volume Per Acre Ten Years Hence</td>
<td>19,925 bd. ft.</td>
</tr>
</tbody>
</table>

Value of Land and Timber Ten Years from now:

<table>
<thead>
<tr>
<th>Merchantable Timber 19,925 x $2.50</th>
<th>$49.81</th>
</tr>
</thead>
<tbody>
<tr>
<td>Value of Bare Land Total</td>
<td>$3.50</td>
</tr>
<tr>
<td>Total</td>
<td>$53.31</td>
</tr>
</tbody>
</table>

Using Compound Interest Tables:

(a) If 1.0 percent is made on the present investment.

\[
\begin{align*}
\$46.26 \times 1.0511 &= \$48.62 \\
0.167 \times 10.2280 &= 1.71 \\
\text{Future Value} &= \$50.33
\end{align*}
\]
TABLE V - Continued

(b) If 1.5 percent is made on the present investment.

\[
\begin{align*}
4.26 \times 1.1605 &= 53.68 \\
0.167 \times 10.9027 &= 1.82 \\
\text{Future Value} &= 55.50
\end{align*}
\]

(Thus, Interest Rate would be between 1.0% and 1.5%).
V. SUMMARY AND CONCLUSIONS

This has been a study of some of the economic aspects of a particular farm forest situation. The data presented have been obtained from only one ranch. However, it is believed that this is a fair presentation of the farm woodlot problem in coastal Douglas-fir type of Sonoma and Mendocino Counties of California.

On the basis of the data obtained, the present value of the stand represents a compound interest rate of only $2\frac{1}{2} - 2\frac{3}{4}$ percent on the past investments (Part 2 a, b, c of Table V). Furthermore, if the timber is held an additional ten-year period for increased growth, the calculated rate of interest based on the present value would be less than $1\frac{1}{2}$ percent. This would mean that by liquidating his investment in timber and investing in securities such as U. S. Savings Bonds, which pay 3 percent compound interest, the owner could gain $12,928.00 over the next ten-year period (Table VI, Part 2).
TABLE VI
RETURN ON AN INVESTMENT OF GROWING TIMBER ON THIS RANCH AS COMPARED WITH AN INVESTMENT IN U. S. SAVINGS BONDS AT 3 PERCENT

1. Compound Interest For Over Past Seventy Years:
   (A) Evaluation of Timberland:
   Total Area in Douglas-fir = 1200 acres
   Present Value (4.6.26 x 1200) = $55,512.00
   Total Initial Investment Seventy Years Ago (1200 x 3.50) = $4,200.00
   Annual Costs (Taxes .167 x 1200) = $200.40
   (B) Present Value of Same Amounts Invested in U. S. Savings Bonds:
   (Using Compound Interest Tables)
   Present Value of Initial Investment
   \[4200 \times 7.9178\] = $33,255.00
   Present Value of An Annuity of $200.40
   \[200.40 \times 230.59\] = $46,211.00
   $79,466.00
   Thus, it is observed that $23,951.00 (79,466.00 - 55,512.00)
   would have been gained by investing in U. S. Savings Bonds.

2. Over Next Ten Years:
   (A) Evaluation of Timberland:
   Initial Investment (Present Value of Land) = $55,512.00
   Annual Costs (Taxes) = $200.40
   Expected Future Value (From Table V)
   \[53.31 \times 1200\] = $63,972.00
TABLE VI - Continued

(B) Value in Ten Years of Same Amount Invested in U. S. Savings Bonds At 3%:

(Using Compound Interest Tables)

Future Value of Initial Investment:

\[ \$55,512.00 \times 1.3439 = \$74,603.00 \]

Future Value of An Annuity of \$200.40

\[ \$200.40 \times 11.4639 = 2,297.00 \]

\[ \$76,900.00 \]

(C) Thus, by not liquidating his present timber assets and investing in U. S. Savings Bonds he can expect to lose \( (\$76,900.00 - 63,972.00) \) \$12,928.00 over the next ten-year period.
It is quite possible that intensive management of this timber tract would increase the annual yield per acre. However such activities would entail additional costs which could easily compensate for the greater gross return. For example, the cost for construction of fences to prevent grazing on restocking areas would represent an investment of considerable magnitude.

Thus it can be easily understood why the owner of this timber would have every desire to liquidate his present investment at the current high prices. For even barring losses from a possible fire, to hold this timber for further growth or to set up a sustained yield unit would mean a monetary loss to the owner. Since the present value of the stand does not indicate a satisfactory return on the past investment (Table VI, Part 1 B), the owner will probably not desire to encourage future timber after the present crop has been removed.

According to information received by the author, the owner of this timber will attempt to convert the cutover land into range for his cattle. Past evidence has shown that such attempts were usually futile. On steep slopes the soil eroded so severely that the land was left barren. On the more moderate slopes a brush and hardwood type of doubtful value became the dominant cover type.

This indeed represents a land use problem. When used to grow timber, this land returned at least some interest on the investment. However, if allowed to develop into a brush patch, the monetary return from this land would probably be negligible.

The writer finds that at present he is unqualified to state as to the most economical use of this land. Fairly conclusive evidence might be presented which would indicate that growing a timber crop
would be a more satisfactory venture than attempts at grazing this area. There is, however, at least one other possibility which has not yet been considered.

Earlier in this report it was stated that the owner of this ranch received $700.00 annually from a private club for hunting privileges. Further investigation might disclose that the operation of a game management area on this ranch would yield a much larger return than the growing of timber. If such were the case, a hardwood cover type would be much more desirable than a coniferous type.

Due to the possible limitations of other uses, it might be determined that the management of this land for a timber crop is its only economic possibility. If such is the case, then it seems apparent an effort should be made to lower the present tax rate and base it on the earning capacity of the land.

The object of this study is not to determine the best use of the land, but to disclose the necessity of a more thorough investigation into the economics of land use. For if we are to expect property owners to manage their lands correctly, we must be able to show that such management will yield a satisfactory return.
APPENDIX
BIBLIOGRAPHY


2. Schumacher, Francis X., Yield, Stand And Volume Tables For Douglas Fir in California, University of California Agricultural Experiment Station, Berkeley, California, Bulletin 491, April, 1930.

