LAND-USE PROBLEMS OF THE
MIAMI RIVER DRAINAGE
TILLAMOOK COUNTY, OREGON

by
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Location

The Miami River is a typical coastal stream of the Oregon coast. It rises in the Coast Range, and flows rather swiftly for a short distance to empty into Tillamook Bay. For a river of its size, the drainage area is rather small, being about 19,800 acres.

Climate

The Oregon coast has a typical marine climate, that is, the average temperature is about 67 degrees, and the seasonal fluctuations from this average is not great. Percipitation is principally rain although some wet snow falls at the higher elevations. Annual rainfall is about 80 inches. A small portion of this percipitation is from fog-drip caused by the condensation of fog on the leaves of trees. Most of the rain falls during the winter months, and the summers are by comparison dry, with only occasional rainfall and frequent periods of low humidity. The prevailing summer winds are from the northwest, and strong winter gales are from the southwest. A few warm, dry winds are from the northeast.
Vegetative Cover

The principal vegetative cover of this area is coniferous forest. The principal forest species are Sitka spruce (Picea sitchensis) and Western hemlock (Tsuga heterophylla), although Douglas-fir (Pseudotsuga taxifolia), Western red cedar (Thuja plicata), and grand fir (Abies grandis) may be found in smaller volumes. A considerable amount of red alder (Alnus rubra) grows along the creek banks. A portion of the upper Miami River drains a portion of the Tillamook Burn of 1933. Some of the better sites have been re-stocked with Western hemlock and some Sitka spruce, but most of the area is bare or heavily covered with brush.

History

The land along the Miami River was first used for salmon fishing. Heavy catches of salmon were taken from these waters for many years. Dairy farms were later started on the flat to gently sloping lands in the stream bottoms. The principal product of these farms was cheese. At present this industry is still thriving, but milk is the chief product being sold.

In 1933 the forest Tillamook fire burned about 3,200 acres of timber at the headwaters of this river(9). The rise in log prices, particularly Spruce, preceding and during World War II enabled many logging firms to start operations in this area. Logging continued in full swing until about 1949 when it slacked off to some extent due to a lack of large accessible high quality timber. Logging continued on a limited scale until 1953.
Today there are three land uses along the Miami River:

1. Dairying in the valley below the 200-foot level.
2. Timber production on the slopes from the 200-foot level to the foot of the very steep slopes.
3. Fish propagation in all the streams where suitable conditions may be found.

Dairying

The soil of the valley floor is of a rich clay and silt loam that is well suited to the present agricultural use of dairying (7). Most of the raw products derived by this means are marketed in the city of Tillamook for milk and to some extent cheese. A soil investigation indicated that the soil of this area is class 2 (according to the classification system of the Soil Conservation Service (11)). It was also noted that some pastures that had at one time sustained large numbers of dairy stock are now being taken over by red alder. This appears to be due to the susceptibility to compaction of the soil when wet and heavily used. Following heavy use by large stock and the ensuing soil compaction, the soil is very susceptible to erosion. Some areas were taken over by alder some time ago and are not being used now. If a market for red alder could be found to pay for the clearing of the land, these lands may be cleared, re-seeded
and used for pasture(6).

**Timber Production**

The prospects for the production of timber in this area are very good. As stated above, the predominant species are of high-value material. Site quality varies from good in the bottom lands, to average on the intermediate slopes and poor on the worse sites where steep slopes, rock outcroppings and shallow soil interfere with tree growth. The major harvesting problems of this area are the high cost of yarding and road building. This is due to the steep and rugged terrain. Since the old-growth stands of this drainage have been almost totally removed (less than 10% of them remain) the age distribution of these stands is poor(6). This means that a great majority of the stands will reach felling age at the same time (5).

**Fishing**

The annual salmon catch of the Tillamook Bay is supported in part by the fish that spawn in the Miami River drainage. The size of the salmon runs have declined markedly since 1940; it should be noted that this trend became apparent when logging started in this drainage (7,8,9,14).

**INVESTIGATION**

As it may readily be seen from the above material, the major conflict in the use of the land of the Miami River drainage is between fishing and forestry. It was
the object of the author to secure sufficient information about these uses to present adequate data upon which to base a reasonable course of action. It became immediately apparent that in the case of the fishing industry, and to a limited extent timber production, there was in existence far too little information to make a definite decision. The sources of the data that follow are noted to the list of references. Estimates are from competent men of the field and from the observations by the author.

Timber Production

In the discussion above it has been pointed out that the potential timber production is rather high, and that the species composition is principally spruce and hemlock. Yarding and road building expenses are high (5).

In addition to the above, the following data was obtained:

The total forest land area is 18,560 acres.

Of this area 10% is site index 180 for the spruce-hemlock type, 10% is site index 160, 50% is site index 120 (varying from 140 to 100), 20% is site index 80, and the remaining 10% is less than 80 (10).

The expected yield of log grades from the second-growth timber produced in this area is as follows:

hemlock - sawlogs, no. 1 - 10%, no. 2 - 30%, no. 3 - 60%
spruce - sawlogs, no. 1 - 5%, no. 2 - 25%, no. 3 - 70%
The present price for logs at the pond is:

- Hemlock - sawlogs, no. 1 - $50/M, no. 2 - $45/M
  - no. 3 - $40/M
- Spruce - sawlogs, no. 1 - $60/M, no. 2 - $50/M
  - no. 3 - $40/M

The technical rotation is about 110 years although a rotation of about 80 years is more practical from an economic point of view. Logging costs for the next rotation are estimated to be $25.13 per thousand board feet (see appendix). Annual protection and administration costs are estimated at about $0.10 per acre. Yield tax is 12.5% of the gross value derived from the timber. A severance tax of $0.08 per M and a forest fee of $0.05 per acre per year is also levied.

**Fish Propagation**

The majority of the salmon caught at the mouth of the Miami River is Chum (*Oncorhynchus keta*) (14). These salmon start their fall run to the spawning areas about August 15th and continue to enter the mouth until about December 1st. The average size of the fish is eight pounds (9, 14).

The cost of production of salmon delivered to the fish buyer is $0.0568 per pound (11). The present price for Chum salmon is $0.11 per pound (14).

In recent years the salmon runs have declined to a great extent. This downward trend in salmon production may be correlated with the logging on the Miami River (9).
The limiting factors caused by logging are:

(1) Logs lying in the stream bottom allow the water to flow through the log jam and do not permit the salmon to pass into the upper reaches of the creek.

(2) The removal of gravel from stream bottoms destroys the desirability for redd (the salmon's nest in which the eggs are laid) building.

(3) The lack of cover on the slopes causes terrific fluctuations in the water level and velocity. Coupled with this lack of cover is the increased siltation of otherwise good redd building areas.

(4) Roads that are constructed along stream banks affect the fish production because too often the dirt that is side cast goes into the stream itself. To a limited extent, the position and construction of road culverts is detrimental to the spawning conditions.

(5) The culverts may be too high for the fish to jump, or the color and shape of the culvert may cause the fish to balk. (1, 2, 8, 12)

Spawning areas must have the following characteristics:

(1) accessible to fish
(2) good gravel bottom.
(3) silt free
(4) stable water temperature and level.
DISCUSSION

There appear to be three alternative courses of action:

(1) Exclude the fishing industry from consideration in the management of these lands and manage principally for timber production.

(2) Exclude timber production from the objectives of land management in this area and manage for fish production.

(3) Combine the two uses so that income from both forestry and fishing may be obtained.

Plan 1

The maximum production of timber will be obtained under moderate intensity of forestry practice. Roads are a major expense and will be constructed in their most economic position (5). Rock for these roads may be obtained from the creek beds. Settings will be made in the most economic locations and all merchantable material will be marketed with provisions for re-stocking the area harvested. Stands will be harvested when they reach their economic rotation. The spruce-hemlock stands of this area necessitate that timber be harvested by clear-cutting in small blocks. Cutting lines will take into account ownership, wind-throw, regeneration, and economy of logging.

Future incomes and expenses were estimated by the author (see the appendix). From this data the present expectation value is $14.21 per acre.
Plan 2

In order to produce the maximum number of fish, an intensive application of watershed management must be practiced in this drainage. Because of the past history of logging the entire drainage area must be maintained with full cover on the hillsides. This will mean that in some instances planting of trees and seeding of other vegetation will be necessary. All logs and other material that is choking the streams will be removed. The practice of obtaining gravel from stream bottoms will be discontinued. The ground cover will be regulated in the future so that the maximum uniform flow of water for the entire season may be obtained. It has been estimated that an eight percent increase in the present fish catch would result from this action (15). The initial cost is about $25,000. This type of land use offer an expectation value of $6.70 per acre.

Plan 2

This plan would entail the management of the land so that maximum economic returns from both industries may be obtained. Under combined management financial returns from both fishing and timber would be realized. The following forest practice would have to be enacted on this land to maintain fish production:

Roads must be constructed high enough above the stream bank to keep the side cast out.

Rock used to gravel the roads of this area must be obtained from places other than in stream beds.
Oat roads must stay out of the stream beds.

The use of high-lead logging may be encouraged because the run-off water is spread out rather than funneled into one lower point.

A strip of green timber next to the stream itself should be left when an area is logged.

Adequate protection from fire, insects and disease must be provided.

Fishing will increase an estimated six per cent over present production under this type of management. Timber yields will be about 98 per cent of those shown in plan 1. This data shows an expectation value of $19.64 per acre.

**CONCLUSIONS**

The most obvious conclusion that can be drawn from this material is that there is far too little known about this problem. The data and estimates that are presented only indicate that combined uses of the land might be the most profitable. There is no cut and dried answer and this report is only the starting point for further investigation. The data that is yet to be obtained includes:

1. What will be the stocking of the timber to be produced in the next rotation?
2. What will be the grade of the logs that are produced in the future?
3. What will be the logging costs for small-diameter timber?
4. How fast will this area regenerate under proper cutting practices?
(5) What will be the initial cost for clearing the streams, etc., for fish propagation?

(6) How many fish will the Miami River and its tributaries support under ideal management and under a system of combined management?

(7) Exactly what is the percentage of fish to each of the limiting factors?

The following is a list of the expectation values for each plan in tabular form:

<table>
<thead>
<tr>
<th>Plan No.</th>
<th>Expectation Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>$14.21/acre</td>
</tr>
<tr>
<td>2</td>
<td>6.70</td>
</tr>
<tr>
<td>3</td>
<td>19.64</td>
</tr>
</tbody>
</table>

It appears from the data in this report that plan no. 3 should have first priority, no. 1 second priority, and no. 2 third priority.
LIST OF REFERENCES

1. Averett, Robert C., Oregon Fish Commission, Portland, Ore.
2. Bond, Carl E., Assistant Professor of Fish and Game Management, Oregon State College, Corvallis, Oregon.
5. Inglis, Richard, Logger, Garibaldi, Oregon.
9. Shippy, Donald, Commercial Fisherman, Garibaldi, Ore.
14. Viles, Don, Fish Buyer, Garibaldi, Oregon.
15. Willis, Ray, Oregon Fish Commission, Bay City, Oregon.
EXPECTATION VALUES

Timber Production
Average Site Index - 120
Average Normal Yield at Rotation Age (80yr.) - 47.5 M
Average Dbh at Rotation Age - 15.4 in
Estimated Stocking at Rotation - 80%
Average Actual Yield at Rotation - 37.9 M

Harvesting Costs:
Felling and Bucking - $6.00/M
Yarding and Loading - $9.35/M
Hauling:
Basic Charge - $1.65/M
Surfaced Road, 14.7 mi at $0.14/M/mi
Logging Road, 5 mi at $0.20/M/mi
Road Construction - $10,000/Section
Yield Tax - 12.5% of the stumpage value

Annual Expense, Forest Fee, Protection, and Administration $0.10/acre/yr.
Income at Rotation:

<table>
<thead>
<tr>
<th>Log Grade</th>
<th>Volume/acre</th>
<th>Price/M</th>
<th>Value/acre</th>
</tr>
</thead>
<tbody>
<tr>
<td>Hemlock no.1</td>
<td>1.9 M</td>
<td>$50</td>
<td>$95</td>
</tr>
<tr>
<td>no.2</td>
<td>5.9</td>
<td>45</td>
<td>261</td>
</tr>
<tr>
<td>no.3</td>
<td>11.7</td>
<td>40</td>
<td>468</td>
</tr>
<tr>
<td>Spruce no.1</td>
<td>1.0</td>
<td>60</td>
<td>60</td>
</tr>
<tr>
<td>no.2</td>
<td>4.8</td>
<td>50</td>
<td>240</td>
</tr>
<tr>
<td>no.3</td>
<td>13.7</td>
<td>45</td>
<td>616.50</td>
</tr>
<tr>
<td></td>
<td>37.9</td>
<td></td>
<td>1740.50</td>
</tr>
</tbody>
</table>

Gross Income at Rotation - $45.92
Timber Production (con)

Cost Summary:

<table>
<thead>
<tr>
<th>Production Cost</th>
<th>Cost per M</th>
</tr>
</thead>
<tbody>
<tr>
<td>Felling and Bucking</td>
<td>$6.00</td>
</tr>
<tr>
<td>Yarding and Loading</td>
<td>9.35</td>
</tr>
<tr>
<td>Hauling (average distance)</td>
<td>4.71</td>
</tr>
<tr>
<td>Road Construction</td>
<td>4.12</td>
</tr>
<tr>
<td>Severance Tax</td>
<td>0.08</td>
</tr>
<tr>
<td>Yield Tax</td>
<td>2.60</td>
</tr>
<tr>
<td>Annual expense (compounded @3%)</td>
<td>0.85</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td>$27.71</td>
</tr>
</tbody>
</table>

Net Profit - $18.21/M or $690.16/acre

Expectation Value:

$$EV = \frac{\$690.16}{(1.05)^{80-1}} = \frac{\$690.16}{48.5614} = \$14.21 \text{ per acre}$$
Fish Propagation

Present Fish Catch 191,205 lb.
Estimated Future Fish Catch 206,500 lb.
Price of Chum Salmon at the Buyer $0.11/lb
Fishing Costs $0.0532/lb
Fisherman's Profit $0.0568/lb
Initial Cost to Put area into Maximum Production $25,000 or $1.26/acre
Annual Costs to Maintain Production $0.16/acre/yr.
Present Annual Profit from Drainage $10,870/yr
Estimated Future Profit from Drainage $11,700/yr
Present Profit per Acre $0.548/acre/yr
Future Profit (in 30 yrs) per Acre $0.592/acre/yr
Rate of Interest 5%

Expectation Calculation:

\[
EV = \frac{0.548 (1.05)^{30} - 1}{0.05 (1.05)^{30}} - \frac{0.592}{0.05} \cdot \frac{1}{(1.05)^{30}}
\]

\[
EV = (0.548(15.37525)) - (0.592(0.2314))
\]

\[
EV = 6.70/acre
\]
Combined Uses of Land

Decrease from Maximum Income Necessary for Combined Use:

- Fish Propagation: 2%
- Timber Production: 8%

Expectation Calculation:

\[ EV = 6.70(93\%) - 14.21(92\%) = 19.64/\text{acre} \]