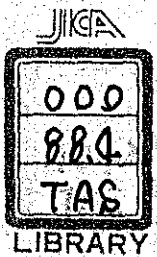


Summary of the Countermeasures
against Forest Fires

1978

Forestry Agency



国際協力事業団	
受入 月日 84.15.236	000
登録No. 306964	4.8.4
	T.A.S

SUMMARY

The occurrence of the forest fires in Japan is seasonal and regional, and their scale is generally small.

Throughout the year, forest fires have a tendency to be more frequent from January to May, especially in the regions where forests face the Pacific Ocean and air is dry from Winter to spring.

As for the scale of forest fire, the area destroyed by fire is normally less than 10 ha (area of 98% of the average cases of forest fires from 1972 to 1976 is less than 10 ha), and the average area of fire is around 1 ha. And those forest fires are overwhelmingly caused by human act, accordingly preventive measures emphasize this fact.

The fire defence organization of Japan is basically a municipal system, but forest fires often range beyond municipal boundaries; therefore, promotion of establishing inter-municipalities cooperation along with positive aids and cooperation of governmental agencies such as Fire Defence Agency and Forestry Agency has been under way.

Main emphasis of the countermeasures against forest fires has been on promotion of enlightenment activities, substantiation of firebreak forestry plantation, and rationalization of fire-fighting technology centering on the aerial fire-fighting.

Especially "Nationwide Forest Fire Prevention Drive" sponsored by Fire Defence Agency and Forestry Agency every year has been becoming a seasonal feature foretelling the coming of Spring, and lately "squirrel" mark enacted as symbol of forest fire prevention is getting popular.

Furthermore, laying out of firebreak green belts, arrangement of firebreak lines etc. and plantation of forestry resistant to forest fire have been positively promoted. To the areas where forest fire breakout is more frequent, Government has appropriated cost of equipping them with fire prevention devices.

On the other hand, due to the technological developments in the field of fire prevention for the forestry, aerial fire prevention technology has come in the stage of actual application, and the nationwide aerial fire prevention bases and helicopter mobilization of Self Defence Force have already established themselves.

1. Fire Prevention and Fire Service Administration for Forest Fires

JICA LIBRARY

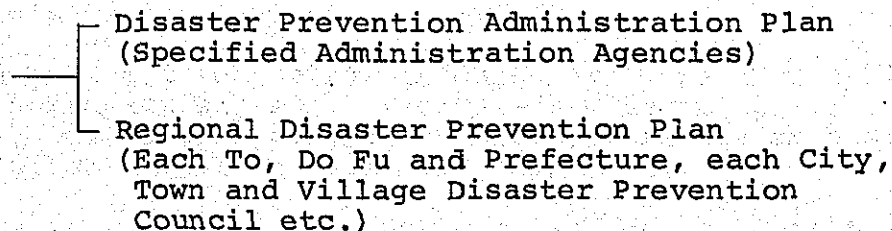


1009473[8]

1-1. Law System

There are following laws for prevention of fire disasters, limitation of disasters after a forest fire broke out, and rehabilitation for fire disasters, and various plans have been laid based on the matters relating to the forest fire.

- (1) Basic Countermeasure Laws against Disasters -- Disaster Prevention Basic Plan (Central Disaster Prevention Council)



- (2) Fire Service Law --- Fire Prevention, Fire Warning, Limitation of Use of Fire, Fire Fighting Operations, Penal Provisions

- (3) Forestry Law --- Permission of Fire Use in Forest, Fire Prevention Facilities, Provisions for Fire Prevention, and Penal Provisions

1-2. Administrative Organization

Present Fire Service System of Japan started in 1948, and responsibility of the fire service has been assigned to city, town, and village self-governing bodies as a rule, and government, To, Do and prefectures supplement fire service administration of city, town and village bodies.

The administrative organizations for the forest fire are described below.

- (1) Governmental Agencies

Administrative organizations directly related to forest fires:

Fire Deffence Agency, Forestry Agency

Administrative organizations related to forest fires:

Central Disaster Prevention Council,
Defence Agency, National Police Agency,
Ministry of Education, Agency for Cultural
Affairs, Environment Agency, Meteorological
Agency.

(2) Organization of Local Self-Governing Bodies

To, Do and Prefectures (47)	—	Fire Service, Disaster Prevention Section, Forestry Affairs Supervision Section
Cities (645), Towns (1,985) and Villages (626) (total 3,256)	—	Fire Department (869), Fire Stations (1286), Fire Station Branches (2,665)

1-3. Administrative Actions

Because the forest fires in Japan are more than half caused by human actions such as carelessly throwing lighted cigarettes, forest fire prevention countermeasures emphasizing fire prevention activities are most important.

Forestry Agency has conducted enlightening activities to promote forest fire prevention conception, forest maintenance patrolling, and distribution of materials and equipment for forest fire prevention.

Besides those countermeasures, Forestry Agency has positively worked with cultivation of the fire-resistant forestry from the standpoint of forest plantation policy.

On the other hand, Fire Defence Agency has promoted fire service measures with emphasis on improvement of fire service organization for forest fires, distribution of firebreaking materials and equipment and so on.

Additionally, this country has as one of disaster countermeasures National Insurance System to compensate disasters caused by forest fires and others. (As non-life damage compensation systems, there are Forest Disaster Mutual Aid Enterprises by Nationwide Federation of Forestry Cooperates and Forest Fire Insurance by private companies.)

(1) Fire Prevention Measures

Fire Prevention Enlightening Activities:

PR activities through TV, radio and posters

Improvement of Fire Prevention Organizations:

organization and promotion of self-defence bodies

Improvement of Fire Prevention Facilities:

substantiation of fire prevention materials and equipment etc.

Forest Maintenance Patrolling: patrol

Firebreak Forests Plantation:

enlargement of firebreak forests, firebreak lines, firebreak green belts, firebreak facilities at the edge of forest roads.

(2) Fire Services

Fire Service Organization:

self-defence fire service organization of cities, towns and villages

Improvement of Fire Service Facilities:

substantiation of direct fire extinguishing facilities.

Fire Prevention Training: joint manoeuvre

Aerial Firebreak Organization:

maintenance of aerial firebreak materials and equipment

(3) Rehabilitation Measures

Compensation for Disasters:

compensation of disasters by National Forest Insurance

Rehabilitation Works:

implementation of forestry conservation, forest road building, forest plantation etc.

Main items of those measures above designated will be described in more details below.

1-3-1. Enlightenment and Fire Prevention Activities

In Japan, year by year demand for recreation has increased and the population of using forests as recreation resorts is expanding. This has led to various enlightenment activities through many advertisement media with promoting awareness of the forest fire, raising moral of those who get in the forests as central themes. Every year, Fire Service Agency and Forestry Agency have sponsored "Nationwide Forest Prevention Drive" in the season in which forest fires is most frequent. They have conducted wide-ranged PR's such as requesting cooperation from Ministries and organizations, and instructed various events to be held and measures to be carried out with priority to To,Do and prefectures.

To,Do and prefectures, cities, towns and villages have

conducted under those instructions fire prevention drives covering the area, parades and the making and distributing of pamphlets and posters with the cooperation of various organizations and bodies.

In Japan also, a symbol mark for forest fire prevention was enacted following suit of the U.S. smoky bear. This symbol was selected from the nationwide applicants; it represents a squirrel with the Japanese traditional fire-man's symbol, Matoi added to it.

Furthermore, as a prevention measure that appeals to the sight of those who walk in the forests, signs, standing sign boards with notices for using fire etc. are placed selectively at the entrances to forests and important locations, and in the vicinities of camping areas and in hiking courses. At the sides near forest roads and at the places where people gather, the ash trays making use of soil pipe and automatic sound alarm devices are set up, and portable cigarette ash trays are distributed to forest workers and general public entering forests in the hope of propagating fire prevention conception among people.

As another way of forest fire prevention, forest patrol is very effective, and in Japan patrolmen have patrolled forests since long time ago.

Government's forest patrol is done as an enterprise subsidized for To, Do and prefectures, and for the national forests Forestry Offices are responsible for patrolling.

Example some To, Do or prefectures have conducted is, in addition to fire prevention, unification of various patrollings of fire prevention forests, and for the protection of birds and animals over the whole area of a prefecture.

An example of city, town and village activities (Tenryu City and other five towns and villages) have had mutual linkage among several cities, towns and villages in patrolling with the results of a great effect on fire prevention.

1-3-2. Planting of Fire Prevention Forests

As a means to prevent the forest fire or to limit the spread of it, set-up of fire prevention green belts by a forestry that is resistant to fire or hard to be burned down is effective, and it actually kept the fire from spreading in Kanao Forestry office of Aomori Department of Forestry Agency.

In Japan, forest planting is in most cases that of needle leaf trees, and positively planting of ever-green broad leaf trees has been very rare. Recently, as a policy to protect forests, cultivation of fire prevention forests or positive placement of fire prevention green belts has been adopted.

The fire prevention line is an open space set up in the forest. It is effective in suppressing spread of fire. In those made in national forests, most of them are 5 - 20m. wide; there are 6,400 km lines in the 755 ha area.

1-3-3 Fire Service Enforcement System and Facilities

(1) Fire Service System

Basically, the fire service system is rooted in city, town and village self-governing bodies, but by enlargement of citizens' life area and distribution of forests, mutual aids among cities, towns and villages, set-up of fire prevention council by several cities, towns and villages, and establishment of widerange fire service system have been promoted.

On the other hand, self-defence fire service system has been organized for national forests, and for some of Forestry cooperates etc.

(2) Implementation of Facilities

For general fire services, expenses for implementation of fire service machineries and equipment, water sources and communication system and their modernization have been carried by governmental finance appropriated to cities, towns and villages. From 1970, Fire Service Agency has furnished radio equipment, water reservoirs and other facilities and materials to local governments, and Forestry Agency has extended to them positive aids as its forests prevervation and administration enterprise.

On the other hand, by the results of the researches and development so far, aerial fire fighting technology has reached actual applications and the materials and equipment of it have been substantiated, and Forestry Agency has provided subsidiary for it.

Also, local public bodies have conducted especially forest fire prevention training in a large scale as the aerial fire fighting practices advance with the main purpose of setting up and employment of the directional system that can cope with large scale forest fires.

2. Fire Extinguishing Technology and its Development

Fire fighting that has been so far done mainly by man-power has to be reorganized from safety as well as man-power saving and efficiency standpoints by introduction of mechanical in order to make it a fully effective fire extinguishing force, and at the same time development of modern method of fire fighting is an urgent challenge.

Fire Service Agency, Forestry Agency and its Forestry Laboratories have divided researches and development among them under the following themes.

- (1) Research on fire extinguishing materials and equipment for the forest fire.
- (2) Research on aircraft utilization in forest fire fighting.
- (3) Research on fire extinguishing strategy for the forest fire.

2-2. Present State of Fire Extinguishing Materials and Equipment

The fire fighting with man-power have had as its main facilities the fire extinguishing by striking flames with live branches and fire-man's rakes, throwing mud with shovels, saws, hatchets and hoes. But since the 1950's, mechanization of forestry works has brought chain-saws, bush cleaners etc., and these machines have been used for opening up fire prevention lines and clearing ground-covering bushes with more than double efficiency compared to the old methods. In addition to those machines, back-carried water vessels and back-carried fire extinguishers are used.

With better organization of forest roads, development and introduction are being promoted of land fire extinguishing materials and equipment which allow fire extinguishing operations in combination with fire engines, bulldozers and other forest fire extinguishing vehicles, small-sized fire engines on re-modelled auto-cycles and other self-propelled vehicles.

Especially, there are researches on highest utilization of small amount of water in place of water most used and effective in fire extinguishing, chemical extinguishing agents, which is expected of large effect in place of water. In our country, various fire extinguishing agents are under experiment. At present, water solution of 15% first ammonium phosphate with 2% spreader (CMC) addition is used for the forest fire.

Reference Materials

1. Budget for Forest Fire Countermeasures
2. Report of Forest Maintenance Patrol Activities
(1976 and 1977 fiscal years)
3. Occurrence and Damage in Money Value of Forest Fires
4. Frequency of Entrance to Forests
5. Occurrence of Forest Fires by Causes
6. Damage of Forest Fires by Area Destroyed
7. Regional Occurrence Distribution of Forest Fires
8. Occurrence of Forest Fires by months of year

1. 1978 Fiscal Year Budget for Forest Fire Countermeasures

The budget for countermeasures against forest fires are appropriated for Forestry Agency and Fire Defence Agency in 1978 fiscal year budget. The budget for Forestry Agency is divided into General Account, Forestry Insurance Special Account, and National Forests Enterprise Special Account. Their outline is as follows.

Kind of Account	Budget (unit: ¥1000)	Remarks
1. Forestry Agency		
(a) General Account	17,593	Fire prevention enlightenment and propaganda etc.
(b) General Account (subsidy)	206,981	Forest Maintenance patrol, equipment furnished to patrol-men
(c) Forestry insurance Special Account	3,430	Provision of fire extinguishing materials and equipment
(d) National Forests Enterprise Special Account (enterprise account)	316,071	Firebreak lines, forest patrol, aerial fire extinguishing machines, initial fire extinguishing equipment and materials
(e) National Forests Enterprises Special Account (forest preservation)	32,570	Cultivating firebreaking forests
<u>Total</u>	<u>576,645</u>	
2. Fire Defence Agency		
(a) General Account	139,450	Provision of forest repair vehicles, fire prevention water reservoirs & radio equipment
<u>Total</u>	<u>716,050</u>	

2. Report of Forest Maintenance Patrolling Activities
(1976 and 1977 fiscal years)

Division	Forest fire	Related to Forestry Law	Stealing forest products	Damage to facilities	Disaster in forestry	Diseases & insect damage	Pollution of forest	Other	Total
1976 cases (rate)	11,085 (46)	2,980 (12)	1,961 (8)	2,066 (9)	2,154 (9)	1,558 (6)	1,690 (7)	833 (3)	24,327 (100)
1977 cases (rate)	10,701 (35)	3,281 (11)	2,354 (8)	2,936 (10)	1,786 (6)	3,403 (11)	2,928 (10)	2,760 (9)	30,149 (100)

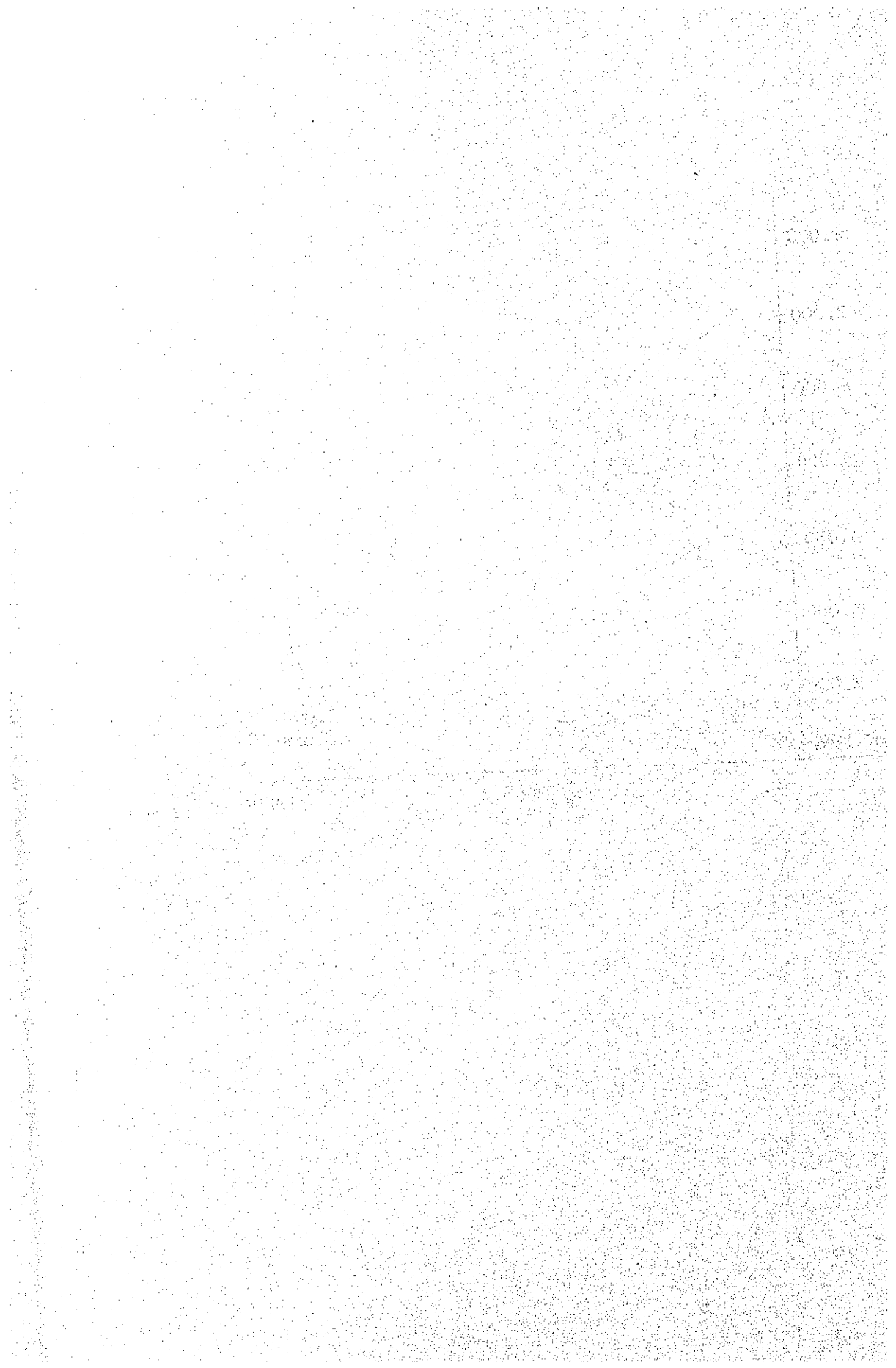
Note: Cases reported are those found by patrolmen in patrolling, and guidance or restraints given to entrants to forests.

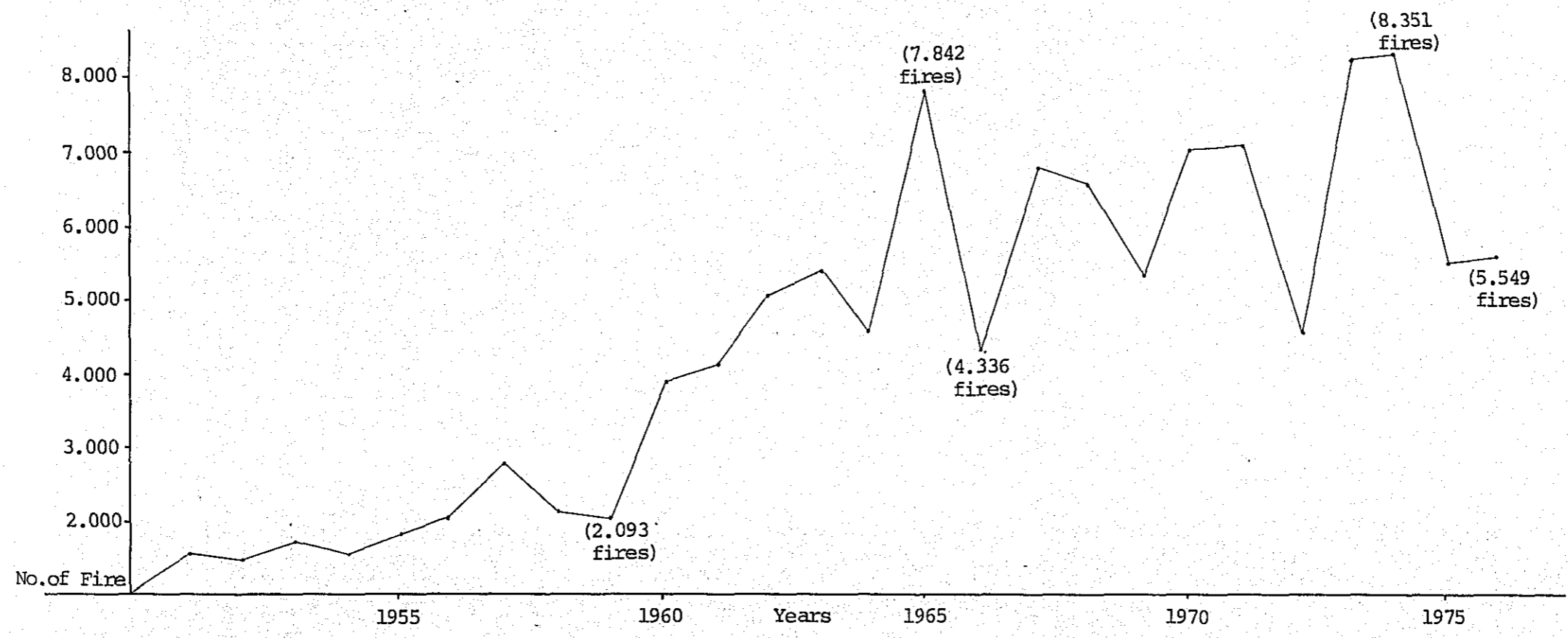
3. Occurrence and Damage in Money Value of Forest Fires

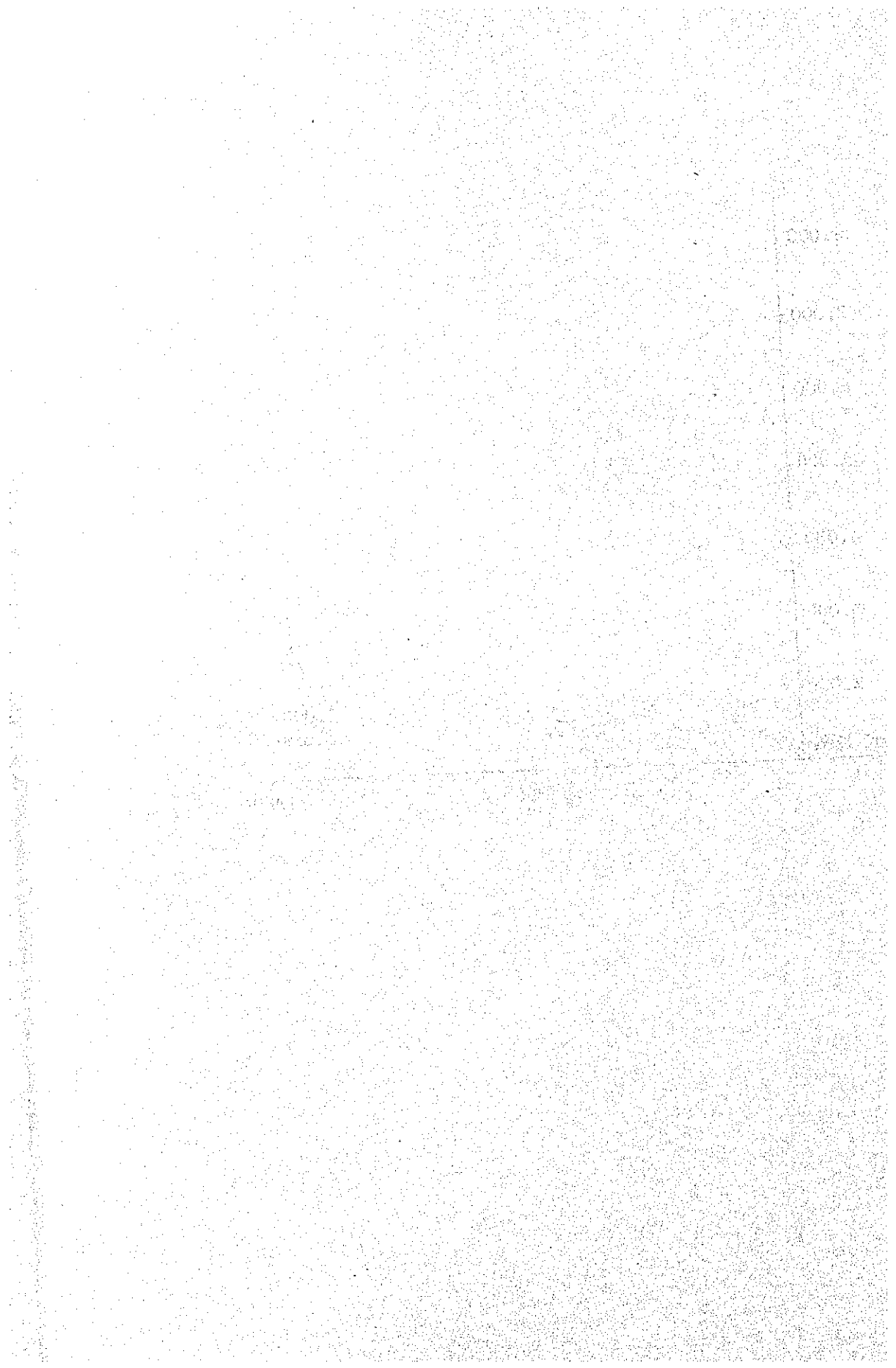
Division	1950	1951	1952	1953	1954	1955	1956	1957	1958	1959	1960	1961
Cases of Fire	1,161	1,528	1,501	1,726	1,579	1,840	2,109	2,844	2,229	2,093	3,941	4,209
Destroyed Area ha	32,715	16,373	60,545	52,898	11,127	5,558	15,151	16,382	6,149	11,445	12,538	182,663
Damage (Unit: 1 million Yen)	344	152	732	655	386	213	890	1,693	305	128	529	5,826

	1962	1963	1964	1965	1966	1967	1968	1969	1970	1971	1972	1973	1974	1975	1976
	5,049	5,443	4,572	7,842	4,336	6,833	6,628	5,348	7,033	7,101	4,541	8,311	8,351	5,517	5,549
	12,747	19,455	8,215	20,995	8,910	11,291	12,707	15,085	14,623	13,370	4,718	8,403	10,937	6,984	5,679
	955	1,104	432	3,393	500	1,842	2,709	2,653	2,497	2,680	843	2,325	3,400	879	2,393

Source of material: Fire Defence Agency





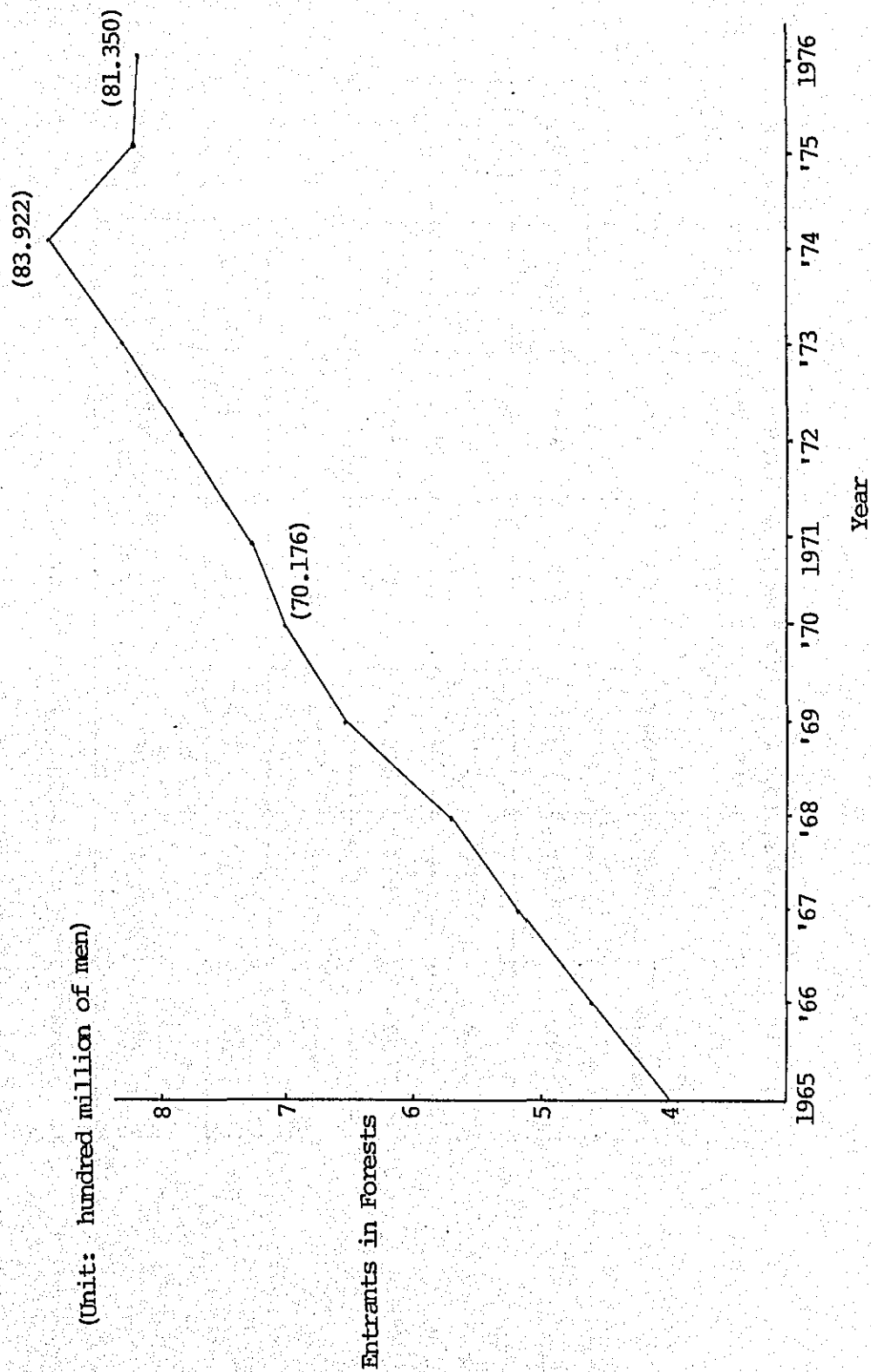


4. Frequency of Entrance to Forests

(Unit : Ten thousand of men : %)

Division	1965	1966	1967	1968	1969	1970	1971	1972	1973	1974	1975	1976
National Parks	18,926	20,212	21,885	25,067	26,981	28,457	30,360	31,869	33,805	33,745	32,530	32,061
Quasi-Nat'l Parks	100	107	116	132	143	150	160	168	179	178	172	169
No. of Entrants Compared to 1965												
Natural Parks of Pre-features	9,982	13,340	16,234	15,701	18,638	19,958	19,321	20,006	21,276	22,000	21,881	22,022
No. of Entrants Compared to 1965												
Total	39,935	46,345	51,855	57,102	65,181	70,176	73,069	78,036	82,950	83,922	82,490	81,350
No. of Entrants Compared to 1965	100	116	130	143	163	176	183	195	208	210	207	204

Source of material : Environmenta Jency



5. Occurrence of Forest Fires by Causes

Causes Years	Bonfire	Tobacco	Playing with Fire	Match & Lighter	Others	Total
1972	1,175	1,310	455	394	1,207	4,541
1973	2,309	2,236	880	658	2,228	8,311
1974	2,580	2,078	642	792	2,259	8,351
1975	1,660	1,326	526	491	1,514	5,517
1976	1,564	1,356	535	442	1,652	5,549
Average cases (rate)	1,858 (29)	1,661 (26)	608 (9)	555 (9)	1,772 (27)	6,454 (100)

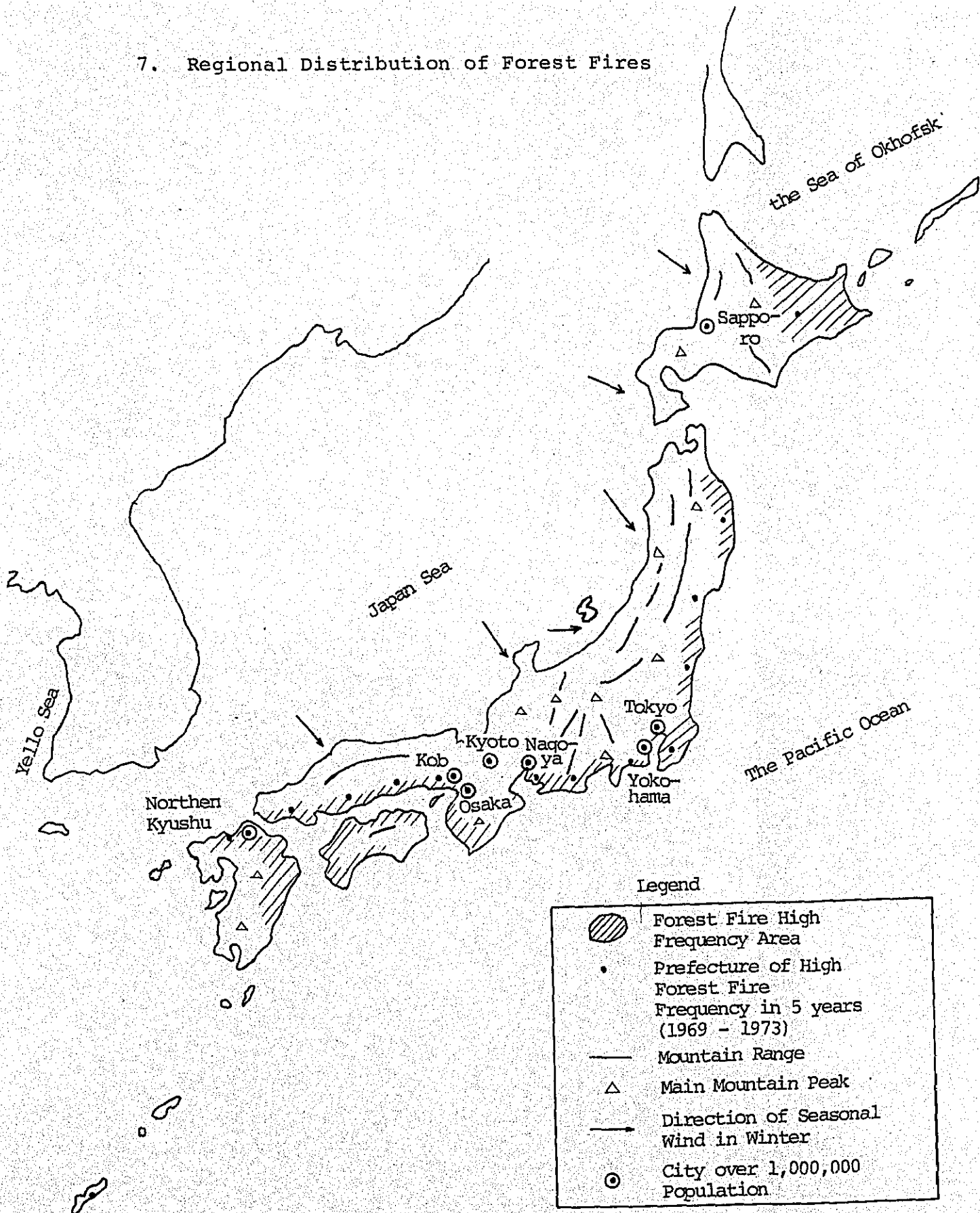
Source of material : Fire Defence Agency

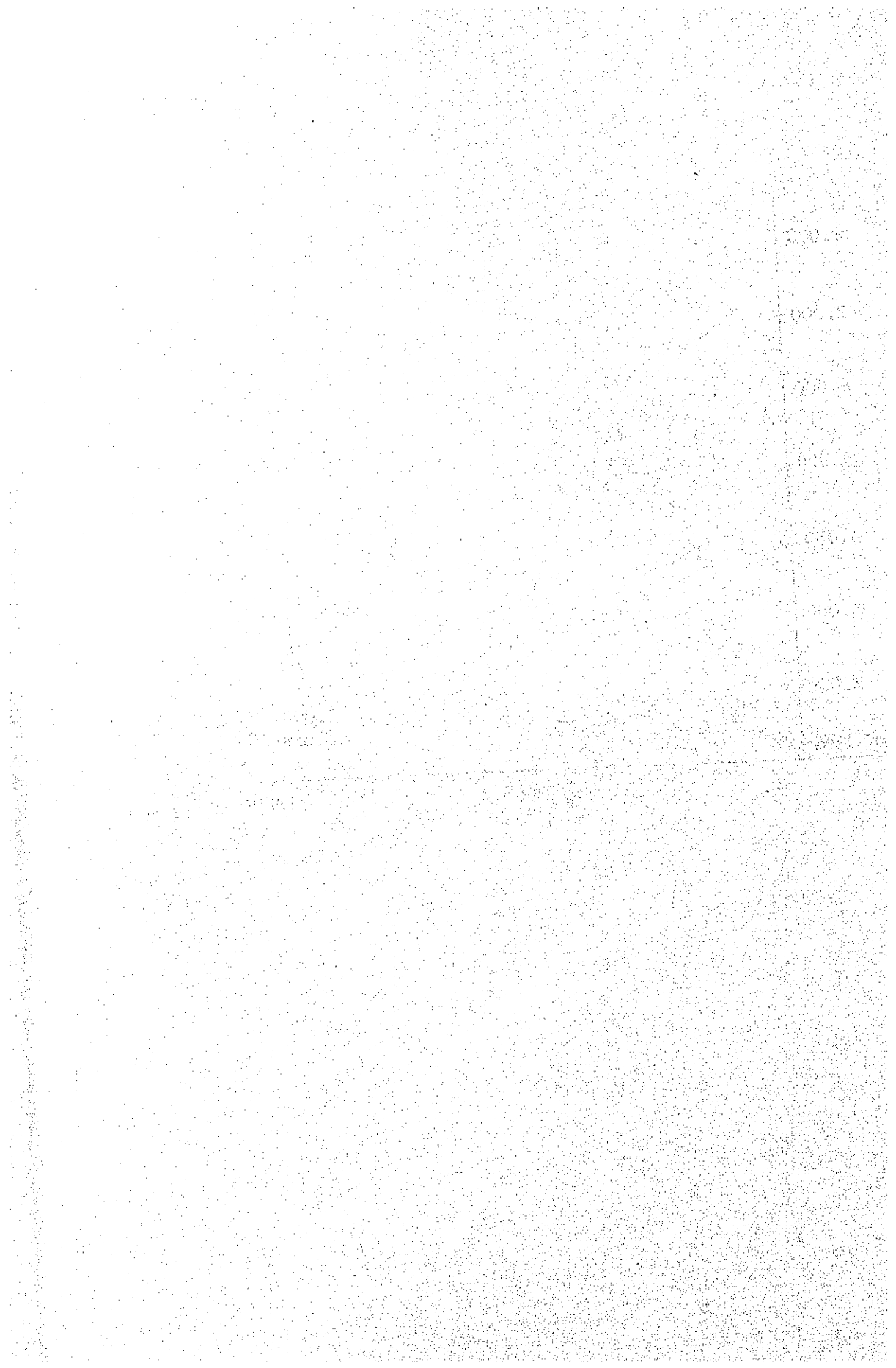
6. Damages by Area Destroyed of Forest Fires

Division	less than 10 a.	10 -50 a.	50 -1 a. ha.	1 -2 ha.	2 -3 ha.	3 -5 ha.	5 -10 ha.	Over 10 ha.	Total
1972 Cases Area (ha)	2,406 61	1,234 257	293 181	234 286	120 262	106 363	71 452	77 2,856	4,541 4,718
1973 Cases Area (ha)	4,351 110	2,397 484	520 326	465 583	171 388	139 512	128 888	140 5,112	8,311 8,403
1974 Cases Area (ha)	4,041 109	2,663 553	571 367	431 554	200 449	166 592	122 799	157 7,514	8,351 10,937
1975 Cases Area (ha)	2,995 78	1,650 334	319 206	255 314	99 221	96 337	54 355	49 5,139	5,517 6,984
1976 Cases Area (ha)	2,904 75	1,668 338	357 233	255 311	114 259	98 378	76 491	77 3,594	5,549 5,679
Average Cases (Rate)	3,340 (52)	1,922 (30)	412 (6)	328 (5)	141 (2)	121 (2)	90 (1)	100 (2)	6,454 (100)
Area No. (ha) (Rate)	86 (1)	393 (5)	263 (4)	410 (6)	316 (4)	436 (6)	597 (8)	4,843 (66)	7,344 (100)

Source of material : Fire Defence Agency

7. Regional Distribution of Forest Fires





8. Occurrence of Forest Fires by Month through Year (Yearly average from 1967 to 1976)

