

RECLAMATION AND MONITORING SUCCESS AT THE
GREGG RIVER MINESITE

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The purpose of this paper is to present the reclamation/revegetation program and the corresponding monitoring program at the Gregg River Minesite.

The Gregg River Minesite has been developed as a joint venture with Gregg River Coal Ltd. having a sixty percent interest and a consortium of seven Japanese companies having a forty percent interest. Clearing of the plantsite and the initial pit and dump areas commenced in the spring of 1981. Construction of the plantsite facilities began shortly thereafter and was completed by the spring of 1983. Mining commenced in October of 1982 and the first train load of coal was shipped in June 1983.

MATERIAL HANDLING

The mine manager Mr. Henning Jensen and the owners of the Gregg River minesite have had an early and serious commitment to reclamation and environmental concerns. This fact is illustrated by the completion in 1986 of the resloping of the entire D4 Dump as well as the entire east face of D2 Dump. Resurfacing with topsoil has also been completed on the resloped portion of the D2 Dump and on a substantial portion of the D4 Dump. Resurfacing is planned for the remainder of D4 Dump. Hydroseeding has also been completed on the east side of D2 Dump. Considering that this is only four years after the initial mining disturbance I am proud of the amount of reclamation completed todate.

REVEGETATION

The revegetation program began in 1981 with the seeding of the construction site disturbance and has been ongoing every year. The main objectives of the revegetation program are:

1. Erosion Control (wind and water),
2. Water Management,
3. Aesthetic Value.

The minesite area has the additional objective of achieving the end land use of wildlife habitat and watershed protection as documented in the Development and Reclamation Approval.

The initial seed, fertilizer and mulch application rates were developed from recommendations made by consultants. These recommendations were followed as close as possible. Later applications were adjusted according to the availability of seed supplies. Besides seed supply other variables such as weather, time of sampling, experience of samplers, reseeding and refertilization of areas, etc., will result in this paper to be considered as a preliminary indication of trends of suitable plant species and their relative success rather than as a scientific dissertation.

GRASS-LEGUME REVEGETATION

A hydroseeder was purchased in 1983 and has been used for the majority of the seeding program. The following is the most recent seed mixture used this summer.

	<u>% by Weight</u>	<u>Rate</u>
Pubescent Wheat Grass (<i>Agropyron trichophorum</i>)	14	
Crested Wheat Grass (<i>Agropyron cristatum</i>)	14	
Creeping Red or Hard Fescue (<i>Festuca rubra</i> , <i>Festuca longifolia</i>)	14	50 Kg/ha
Orchard Grass (<i>Dactylis glomerata</i>)	14	
Climax Timothy (<i>Phleum pratense</i>)	14	
Alsike Clover (<i>Trifolium hybridum</i>)	18	
Rambler Alfalfa (<i>Medicago</i> spp.)	12	
Fertilizer 6-24-24		500 Kg/ha
Fertilizer 34-0-0		50 Kg/ha
Mulch Fibramulch		125 Kg/ha

Hydroseeding has also included; Streambank Wheat Grass (*Agropyron riparium*), Intermediate Wheat Grass (*Agropyron intermedium*), Kentucky Blue Grass (*Poa Pratensis*) and Smooth Brome (*Bromus inermis*). Approximately 110 ha has been seeded on the plant and mine site to date.

TREE-SHRUB REVEGETATION

Seeds and cuttings from native conifers and shrubs were collected in 1984 and propagated in the greenhouse facilities operated by Hutchinson Environmental Associates Ltd. in Whitecourt. The following trees and shrubs were planted in 1985 in demonstration plots on a reclaimed slope below the shop and above the Gregg River.

White Spruce	(<i>Picea glauca</i>)
Lodgepole Pine	(<i>Pinus contorta</i>)
Balsam Poplar	(<i>Populus balsamifera</i>)
Wolf Willow/Silver Berry	(<i>Elaeagnus commutata</i>)
Red Willow	(<i>Salix bebbiana</i>)
Wild Rose	(<i>Rosa woodsii</i>)
Buffalo Berry	(<i>Shepherdia canadensis</i>)
Shrubby Cinquefoil	(<i>Potentilla fruticosa</i>)
Bearberry	(<i>Arctostaphylos uva-ursi</i>)

MONITORING PROGRAM

A revegetation monitoring program was developed and implemented in 1983. The program was developed to; 1. assess the revegetation program in order to plan future programs to meet the revegetation objectives as outlined earlier, and 2. to assess the revegetation program to meet the requirements as outlined in the annual report guidelines (1983).

The monitoring program involves a number of plots using a quadrat (20 cm x 50 cm). Initially the plot locations were chosen using a grid system and random number tables. Subsequent plot locations are in the same area as the initial random plot areas. Measurements are taken of the following parameters.

Density - number of plants per plot

Cover - percentage of plot covered with foliage

Biomass - air dried weight of annual plant production in each plot

Rooting Depth - depth of roots of the dominant species in each plot

Frequency - number of times a species appears in the sample plots

The time of year of the monitoring program has been a variable due to the weather in the area.

<u>Year</u>	<u>Date of Snow</u>	<u>Date of Monitoring</u>
1983	September	Mid October
1984	Sept. & Oct.	Not Completed
1985	After Monitoring	Mid August
1986	After Monitoring	Late July

GRASS-LEGUME REVEGETATION RESULTS

Frequency

The overall summary of the frequency results is shown in Table 1. Figure 1 illustrates these results.

TABLE 1
FREQUENCY SUMMARY

Year of Monitoring	(Percent of Plots)		
	<u>1983</u>	<u>1985</u>	<u>1986</u>
Alsike Clover	69	58	57
Climax Timothy	92	43	70
Orchard Grass	96	76	89
*Fescue	31	48	66
**Wheat Grass	90	52	45

Although this is preliminary information, it seems likely that Orchard Grass and Timothy are the most successful species. The fescues seem to be increasing while the wheat grasses seem to be decreasing. Not shown are a number of native species which are invading some areas.

- * Fescue includes Canada #1 Red Fescue, and Alpine Sheep Fescue.
- ** Wheat Grass includes Crested Wheat Grass and Pubescent Wheat Grass.
- *** Rambler Alfalfa was used only in the last few years and todate monitoring has not detected any; however alfalfa is evident on the site.

Cover

The percent cover is detailed and illustrated in Table 2 and Figure 2 respectively. With the exception of the 1984 seeding areas, the amount of cover is increasing.

Density

Table 2 and Figure 3 detail and illustrate the average density monitoring results. The density of the 1984 seeding areas and the 1981 seeding areas seem to be increasing while the density of the 1982 seeding and 1983 seeding areas seem to be decreasing. The density of all areas seem to be in the 40-55 plant per plot range. It must be remembered that this is a preliminary monitoring program and no conclusion will be made to date.

**TABLE 2
MONITORING SUMMARY**

Year of Monitoring	Average Percent Cover			Average Density (No. of Plants/Plot)			Average Biomass (gms)		
	1983	1985	1986	1983	1985	1986	1983	1985	1986
<u>Year of Seeding</u>									
1981	24.5	39.0	65.0	22.0	37.5	42.0	33.2	12.5	37.6
1982	10.9	47.7	53.7	60.1	60.8	45.8	7.2	31.3	22.9
1983	14.5	44.9	61.0	99.0	62.6	51.1	6.4	37.2	18.4
1984		43.3	41.4		43.9	52.3		31.8	19.6
1985			41.8			39.1			17.4

Biomass

The biomass production is detailed and illustrated in Table 2 and Figure 4. It would be expected that the biomass production would be greatest in the established seeding areas. The 1983 and 1984 monitoring results confirm this. The 1985 results show the opposite. An explanation of this deviation is not available. Again this is preliminary data.

TREE-SHRUB REVEGETATION RESULTS

Table 3 details the survival rates of the trees and shrubs planted in 1985. No conclusions have been made since this data is very limited and preliminary.

TABLE 3

TREE-SHRUB SURVIVAL RATES

White Spruce	91.5%
Wild Rose	76.7%
Lodgepole Pine	73.7%
Buffalo Berry	72.9%
Wolf Willow	67.3%
Cinquefoil	48.0%
Willow	47.4%
Black Poplar	40.0%
Bearberry	19.4%

Finally, I would like to acknowledge the work and effort of two of my colleagues. Mr. Kevin Beingessner who was responsible for planning the initial revegetation program which was used on the plantsite areas after construction, and Mr. Rick Zroback who has the responsibility of supervising the revegetation program and monitoring program both past and present.

CONCLUSION

A visual inspection of the area indicates that the main objectives of the revegetation program has been successful. It is hoped that many (if not all) of you will be able to attend the tour tomorrow and judge for yourselves. The monitoring program also was successful in providing some preliminary data. As this data is gathered it may be necessary in the future to refine the monitoring program to provide more meaningful data.

FIGURE 1

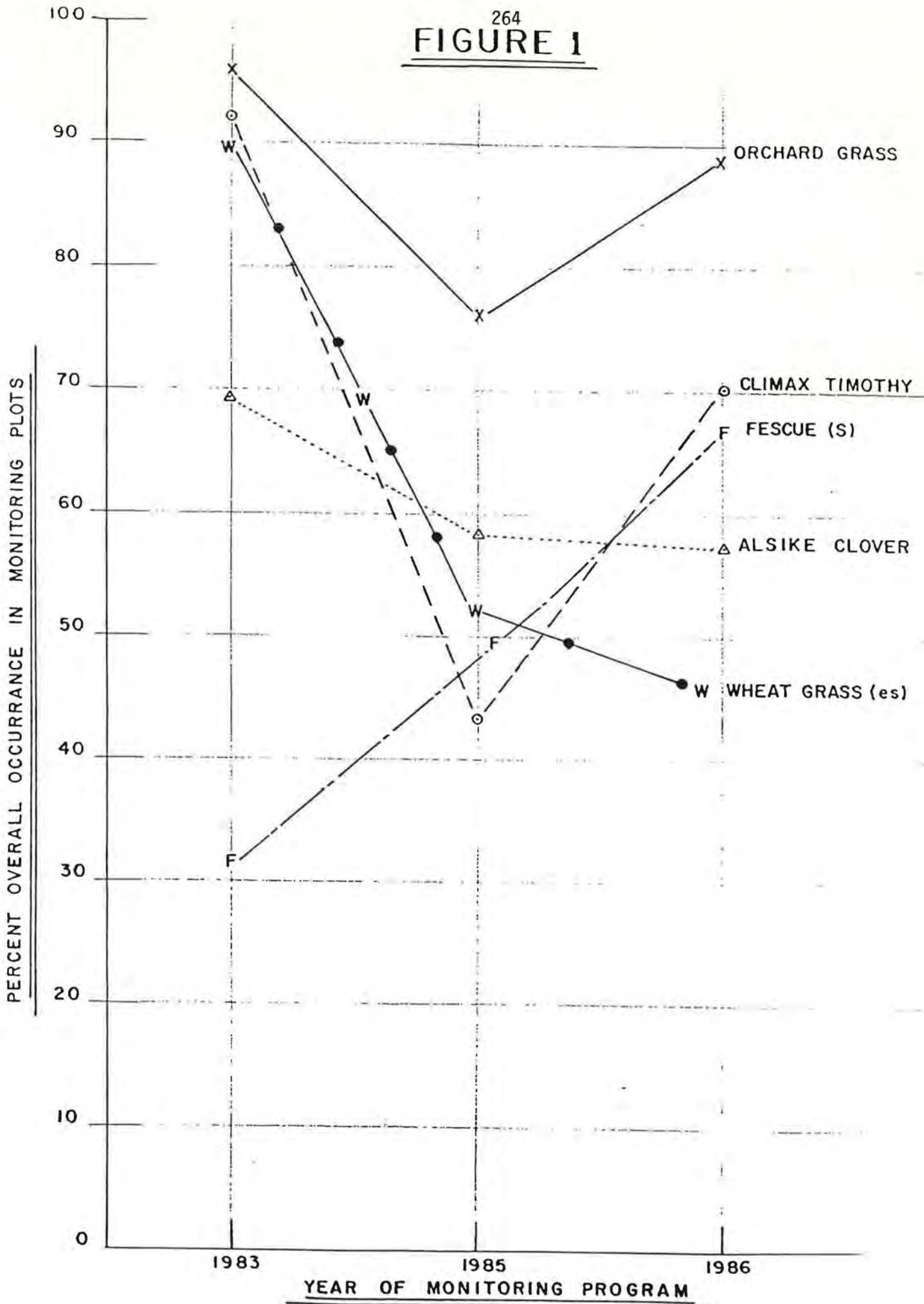


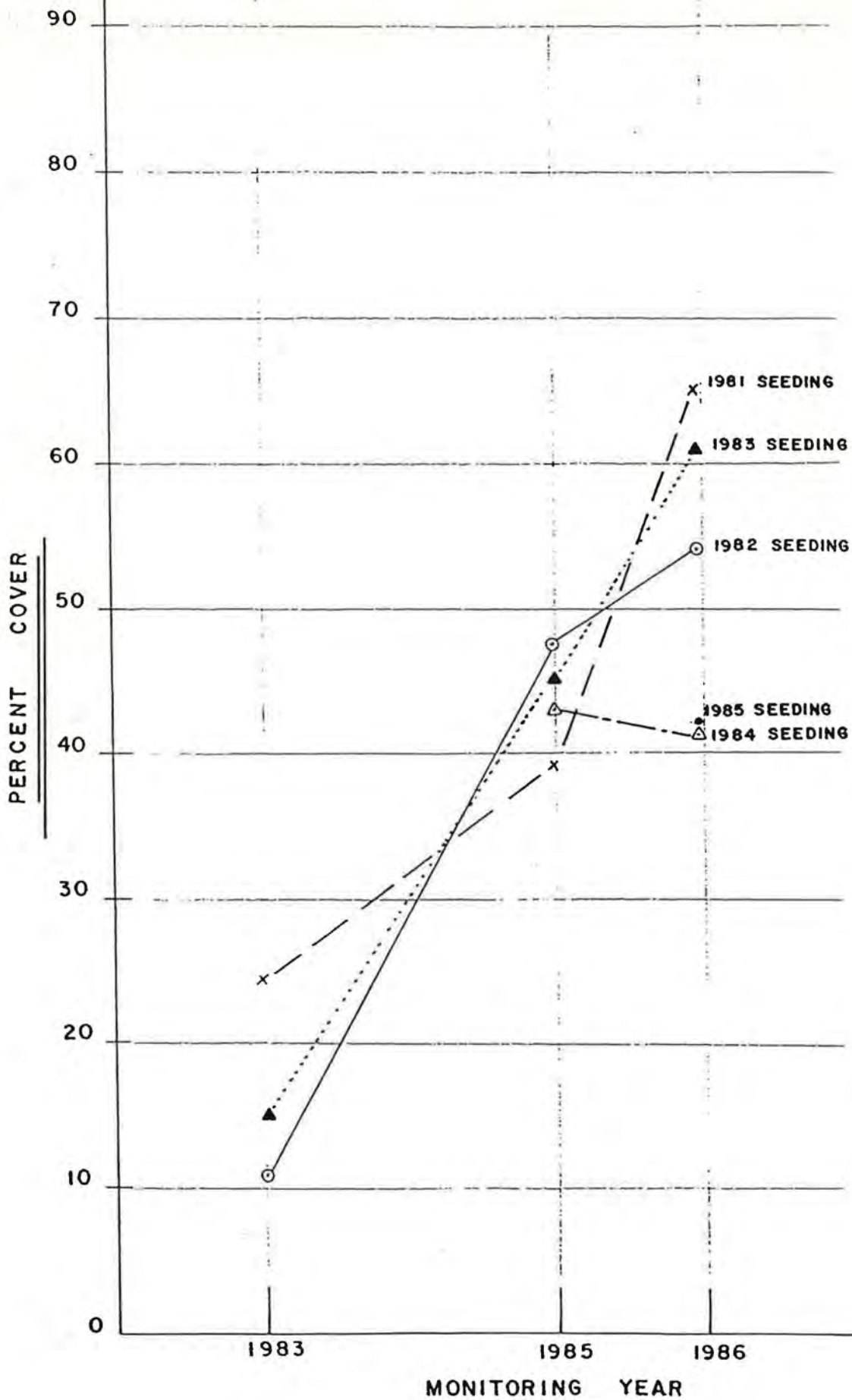
FIGURE 2

FIGURE 3

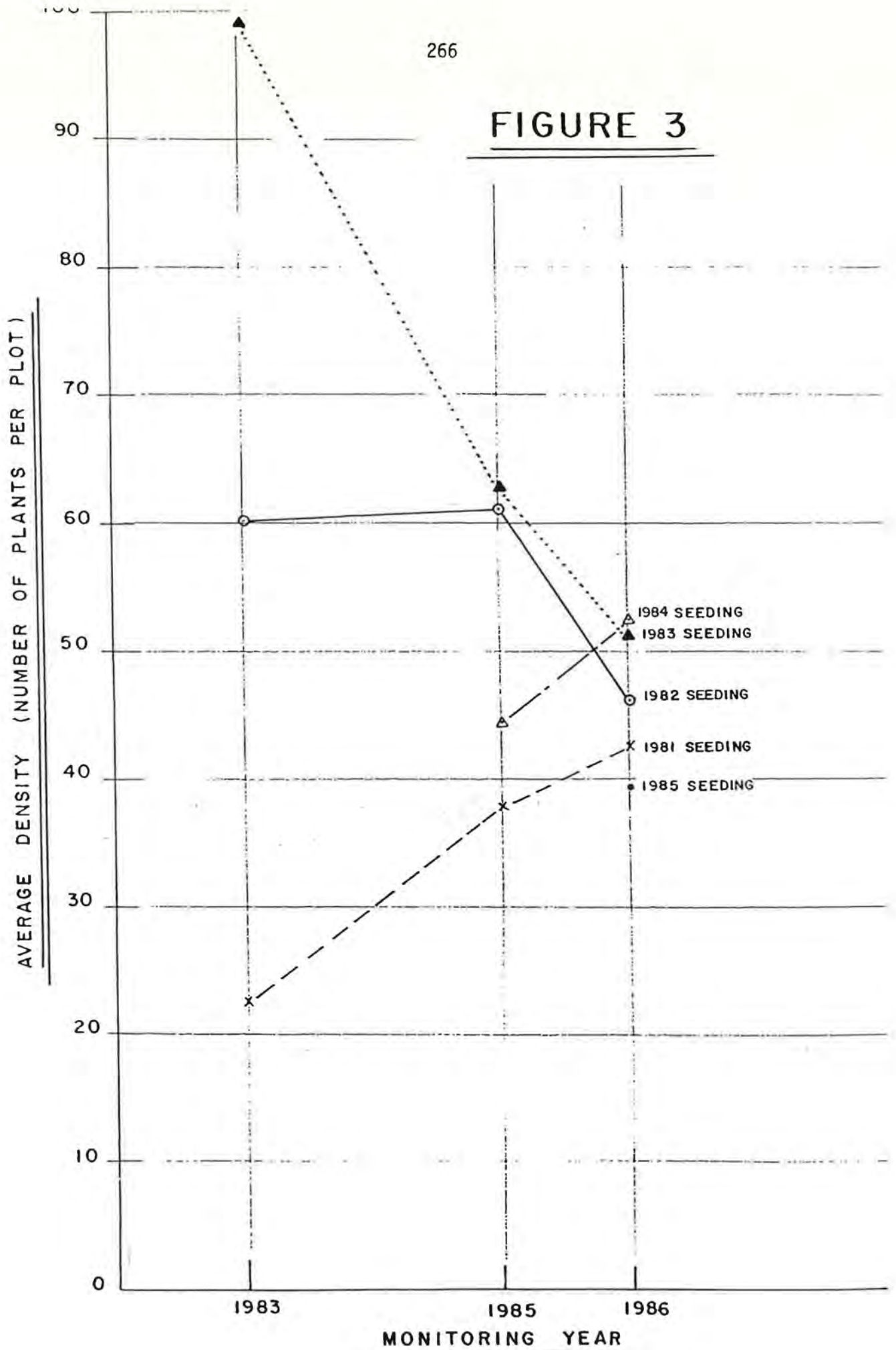
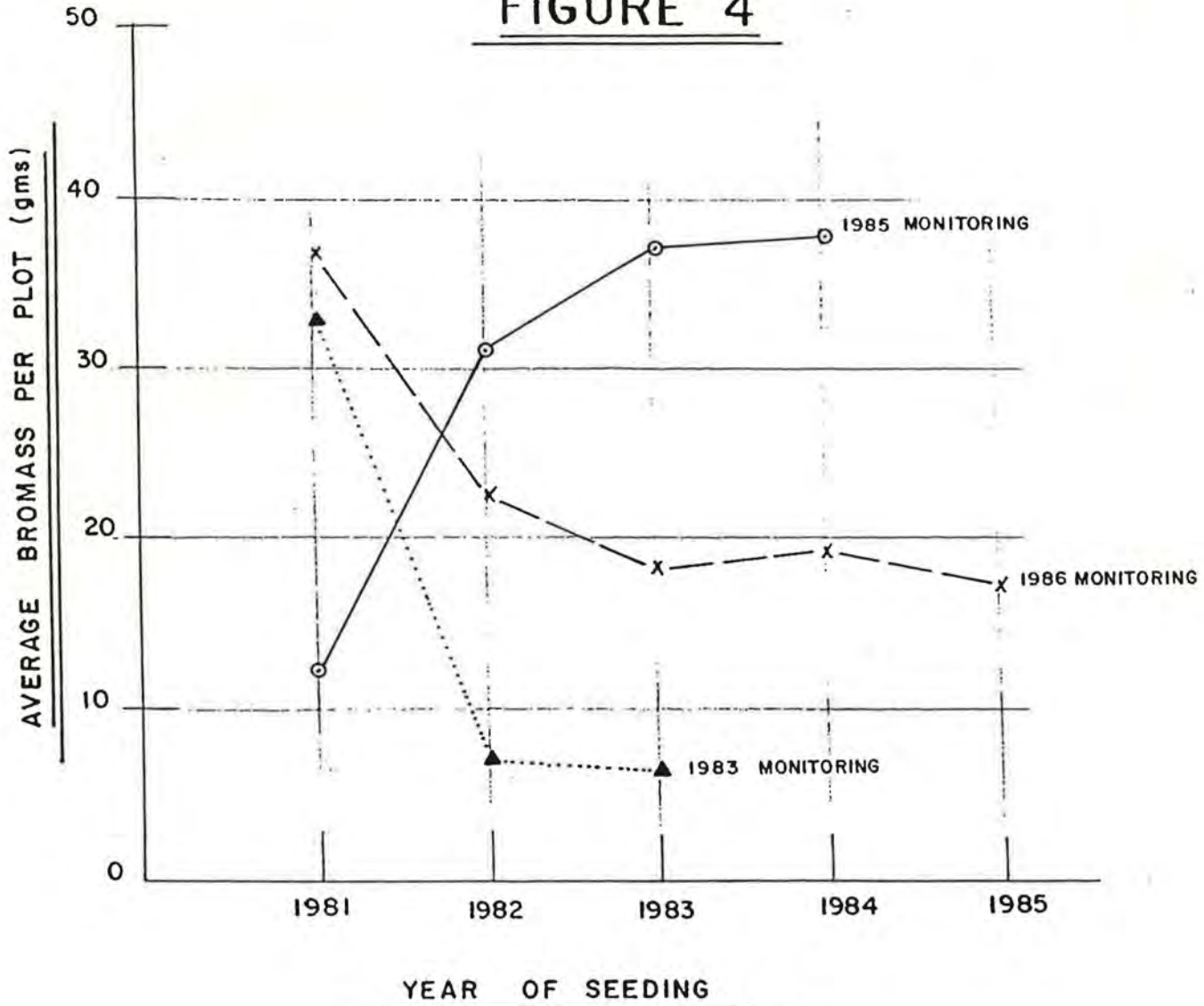


FIGURE 4

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PROCEEDINGS

ALBERTA RECLAMATION CONFERENCES

1985
Planning and Certification
of Land Reclamation
April 16-17, 1985
Edmonton Inn, Edmonton

1986
Reclamation in the
Eastern Slopes of Alberta
September 25-26, 1986
Overlander Lodge, Hinton

C.B. Powter
R.J. Fessenden
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1985: Planning and Certification of Land Reclamation, April 16-17, 1985,
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Powter, C.B., R.J. Fessenden and D.G. Walker, compilers.

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For more information on the Alberta Chapter or the Canadian Land Reclamation Association please write to CLRA, Box 682, Guelph, Ontario, Canada N1H 6L3.

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