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SOMALI DEMOCRATIC REPUBLIC

national range agency

request by
the

GOVERNMENT OF SOMALIA

to the

WORLD FOOD PROGRAMME

for the expansion of project "somalia 719"
"reforestation and rangeland development"

october 1977

SOMALI DEMOCRATIC REPUBLIC

Request from the Somali Government to the World Food Programme for the expansion of Project SOM 719. Reforestation and Rangeland Development for a period of three years.

1) Background Information

The Somali Democratic Republic has an estimated population of 3.5 million in a territory of 637,000 km^2. The population is growing at 2.6 % per year. Some 80 % of the labour force is devoted to livestock and agriculture, 13 % to services (mainly governmental), and 7 % to industry - Somalia has been classified as one of the least developed of the developing countries and is included among the "hard core LDCs". It has a per capita G.N.P. of US $ (90 annually (estimated for 1976).

Somalia has a semi arid to arid climate with average annual rainfall ranging from 600 mm in parts of the South and on the top of highest parts of the northern escarpment to less than 100 mm in the northern and north eastern coastal plains. Rainfall is also variable ranging from 250 % to 10 % of average.

Apart from limited areas of the two river valleys in the south where irrigation is possible agriculture is limited by rainfall and soils to the level where much is marginal and crop failure a regular occurrence.

Over 90 % of the country is open rangeland carrying 5 million camels, 4 million cattle, 9 million sheep and 15 million goats. (For regional distribution see Annex G).

Due to highly variable rainfall carrying capacity fluctuates wildly, necessitating migration of herds even in normal years. Rough migration movements are given in Annex H.

During serious drought as in 1973 - 75 such migrations were insufficient to prevent massive loss to livestock causing destitution in the two thirds of the population which are nomadic or semi-nomadic and a serious setback for the economy 80 % dependant on livestock and livestock products for its foreign exchange.

The Government, whilst placing priority on the livestock sector, is also aware of the problems of in servicing a mainly nomadic community with basic social services, particularly health and education. It has therefore accelerated the policy of settlement and sedentarization of nomads in areas capable of arable agricultural development. Nevertheless the majority of the population will remain partly or totally dependent on livestock for some time to come.

In light of the situation and the essential unsuitability of the great majority of the country for arable agriculture the Government is pursuing a policy of creating sustained and increasingly productive use of land for livestock and forestry development.

2) Purpose of the Project 719 and its progress.

Project Aims.

The purpose of the original project has been to execute reforestation and range development works with voluntary workers willing to accept food for work on a self help basis. The works were to be done under two related schemes, namely a rangeland development scheme and a scheme for reforestation, erosion control and stabilisation of sand dunes.

The rangeland development scheme comprised the demarcation of reserves and setting up a system of control so that in the dry season livestock, with permanent access to water, would have sufficient grazing, and in the wet season the reserves would be closed to all livestock. Necessary related works had to be done; stone wall terracing to slow down the run-off of rainwater, water spreading and retention works through bunding and pit silting; and forage tree planting. This scheme had to be operated in the north west and north east part of the country.

The reforestation scheme had to undertake anti-erosion measures in the Gaanlibah area in order to increase water retention capacity and to limit soil erosion, including control of tree felling, a temporary ban on livestock grazing in the designated areas, and replantation of denuded forest areas. Full planting had to be carried out in the Berbera area, in order to secure a supply of fuel and construction wood; and in the south of the country to prevent the shifting of sand dunes. The works were to consist of seedling production, planting of seedlings, pit digging, shrub clearance, terracing, construction of check dams and retaining walls, and related maintenance activities.

Project Progress.

Whilst data on project progress will be submitted separately to the 719 Evaluation Mission a brief outline is given below.

In the first period of the project most of the activities undertaken represented innovations with respect forestry and range management, hence a considerable component of research and demonstration was involved. Range reserves (famine, seasonal, rotational and town) were set up and, after some initial resistance from stock herdsmen, proved both accepted and indeed requested by local communities. Only where their size restricted normal stock movements did some difficulties of management occur. Operationally seasonal reserves proved less easy to administer. Guards had to be rehired every time that the reserves were due to be closed and variable closure dates in relation to early or delayed rainfall could not be practised since this made operation too complex for both users and local administrators. It has now been decided to operate a rotational system of deferred grazing which uses guards on a year-round basis and extends the rest period of one sector of the grazing from one season to two years.

Various systems of soil and water conservation were implemented mainly in the North West and Central area of the country. All sites must be treated as experimental schemes since little experience of such works existed previously in Somalia. Of the two, diversion and irrigation of grassland (including planting of fodder crops) met with only limited success. Such works are costly in both capital and manpower and lack of technical data on their placing and construction often lead to failure and added cost in rebuilding. Whilst the use of floodwaters from seasonal rivers remains attractive in producing additional forage future development will be restricted to strategically and economically viable sites and steps will be taken to obtain adequate technical staff to design and supervise construction.

Waterspreading through bunding of sloping land proved more successful. Technical skill requirements are less critical although only those bunds made by hand are likely to be economically viable. Trials with machine dug bunds were expensive, and on some difficult sites breakdown of machinery and delays only added to their costs.

Two sites for fodder production through river irrigation have been started but harvesting has not yet been undertaken.

In overall terms soil and water conservation works and the production of additional fodder has proved possible but economically dependant on adequate technical supervision and strategic siting in relation to proximity of markets in towns, ports and stock marketing routes.

Range development through cooperatives has been initiated in the north. In seven centres both range management and fodder production on a small scale have been undertaken by range cooperative members. Such activities are more suitable in areas where fodder and other crops can be grown in conjunction with range grazing.

Most manpower had been engaged in forestry plantation activities in the initial stages of the projects. In Berbera area tree plantation of the coastal strip proceded more slowly than expected in the area where a hard pan was found below the surface. The rate of hole digging (and thus planting) was thus reduced. Also the original targets of area to be covered in a three year period were incorrectly formulated. Not only should the cycle have been extended to 10 years to ensure a sequence of planting geared to the growth rates of the trees concerned but the area covered should have been reduced since the land suitable for planting is only one kilometer wide parallel to the coast.

The Bakiga/Ghanlibax reforestation has also been below targets, particularly due to the limited availability of water to establish a nursery on site. Seedlings have to be transported from some distance away limiting planting in the short rainy period.

Sand dune stabilization at Merca has been undertaken both through this project and through voluntary participation.

Whilst the work has been successful the operation is extremely expensive. Nevertheless techniques used and species planted have been evaluated and further works planned can be made more cost effective. Such works will be limited to areas of high economic importance or undertaken on a pilot/ demonstration basis only.

3) Present request. Purpose of the expanded project and of W.F.P.Assistance.

As detailed subsequently the purpose of the project is to continue and expand activities in rangeland and forestry development geared to labour intensive works. The aims are to regenerate and make more productive the range and forestry resources of the country whilst expanding employment potential in rural areas. The expanded project would have national coverage in full realisation of the need for improved range and forestry resources in all areas of the country.

The purpose of WFP assistance would be to provide food both as a major part of wages for workers on Government schemes and as an incentive to members of cooperatives to participate in upgrading the resources of their own areas. Such assistance would also improve the nutritional status of workers and their families, most of whom would be unable to obtain sufficient remuneration from their depleted herds or whose subsistence capacity has been removed entirely by the death of their stock during the recent severe drought.

Strategy.

In order not only to prevent deterioration of land but also to increase productive capacity of range and forestry areas systems of management have been introduced to maintain or improve the grass and forage production of the range and the productivity of areas suitable for forestry. The strategy is directly linked with employment creation, perceived as the major goal of the Development Plan, and is also aimed at creating viable settlements where nomadism as a modus vivendi is reduced by stabilizing the productivity of the immediate environment.

Rangelands.

Two distinct but allied strategies are considered appropriate for increased range productivity. For most rangelands, management through controlled deferred grazing is deemed appropriate. In this case the system

of rotational grazing around a permanent water point has been chosen as a promising way of promoting range regeneration. From previous experimental and demonstration areas results indicate that such systems might be expected to increase range productivity by at least 25 % if practiced on a widespread basis. The method is applicable both to open rangeland and also the heavily grazed areas around towns and Villages.

Organizational systems will depend on the areas chosen. Most of the rotational reserves will be managed by the National Range Agency directly, although where local committees are able to organise cooperatives or range associations the management of the deferred grazing system will become the responsibility of the community with advice from the Agency. Long term responsibility will ultimately be vested in local committees once extension and demonstration efforts have gained universal acceptance.

As an interim measure, and parallel with the deferred rotational grazing system, a network of famine reserves will be created under the exclusive control of the N.R.A. Such reserves will create strategic areas of rangeland closed in all but drought years. They will afford emergency feeding areas for livestock in reasonably close proximity to normal grazing grounds and will be converted to normal rotational reserves once sufficient of these are created in an area such that the reserved sectors of all the rotational reserves constitute 10 % of the total available grazing and browse.

The second strategy in increasing range productivity is to construct through tug diversion, river irrigation or water spreading (bunding) fodder farms where grasses and other fodder crops can be grown to increase the animal feed available to an area. Such schemes are expensive to create and are only applicable where topographic conditions or surface water availability permits. Nevertheless the use of river flood waters or surface run-off are an attractive and potentially economic proposition in some areas and should be exploited where economically and technically justified.

In order to maximise capital outlay sites will be chosen which are proximate to existing marketing routes, export channels and centres of demand for dairy cattle feeding. Where fodder prices are high returns can repay investment costs in reasonable time. Such centres will also act as demonstration areas for communities, through cooperatives, who might improve the productivity of their own areas, by such techniques, whether growing fodder crops or other agricultural or horticultural produce.

Both strategies require an active research, demonstration and extension programme to orientate the systems and maximise the returns of range management. They also rely on the systematic and sympathetic development of water resources in range areas.

Water development is largely the responsibility of District Councils. The crucial linking and balancing of range capacity with water availability demands a strong coordination between the authorities responsible for both since without it, no sustained system of livestock development can be introduced. Similarly the fields of animal health and livestock marketing are inextricably bound with range and water development. Ultimately, even with grazing and water supply balanced, control of animal numbers is essential to long term range productivity.

As development phases, range capacity should precede water development, which, once introduced, should be followed immediately by range management. After this, improved marketing and animal health services should be linked to these foci of improved livestock production. Should this order be reversed range detioration and economic disaster at both lo al and national level will surely follow.

Financial Implications.

No system of overall range management and selective increased productivity can be accomplished without considerable expenditure at the initial stages. Likewise no such system can be maintained unless productivity exceeds financial outlay. Since the sector is by far the most important in the national economy the costs involved cannot be subsidized by the profits from any other sector.

It follows therefore that large scale schemes should be based on strict economic principles and that prior consideration should be given to recouping the costs of countrywide range development. Annex indicates the potential benefits and costs of both deferred grazing systems and fodder production.

Since the information is based on limited experience under Somali conditions re-evaluation of the economic justification for the strategies should be undertaken as soon as schemes produce operational and quantifiable data.

Reimbursement of capital and recurrent costs will be undertaken in several ways. Fodder production schemes produce a salable product which will be sold at economic prices to traders and livestock owners.

Range management schemes will be funded by charging a grazing fee (either directly or as part of a single water and grazing fee) and indirectly through taxing the end product - exported or locally slaughtered livestock.

Social and Economic Benefits.

These are threefold :- the direct increase in the resources of the livestock owner, having available an increased range production for stock productivity (meat, milk and marketed animals); the greater potential for settlement (due to a more sustained (less variable) carrying capacity of the local range) bringing with it the potential for siting educational and health facilities within easier and more permanent reach of herdsmen's families; the expansion of permanent employment (range guards and fodder farm workers plus workers in cooperatives) in areas traditionally providing few job opportunities for the expanding population owning none or few livestock.

Forestry

Although a separate subsector of the economy, forestry development is inextricably bound with range activities. Not only are woodlands and forests also natural grazing areas but forestry management has very direct influence on the grasslands of the foothills and plains below. Soil and water conservation must start with afforested areas. Without this the environment will (and has) deteriorate for the animal (and human) population. Cutting of trees for wood, charcoal and forage continues to denude the water catchment areas, particularly in the north of the country. Run off increases, reducing the water penetration of the lower slopes and creating raging seasonal rivers which carry away precious soil and water.

Rangeland and forestry development must thus go hand in hand if land productivity is to be revived.

Strategy for forestry development is also twofold. Forestry reserves must be created and expanded both to protect forests from destruction through overuse and to allow natural regeneration of seedlings otherwise killed through animal browseing and trampling. Whilst the reserve is inexpensive to set up and maintain some areas require a more active programme of replanting. These would include areas surrounding many towns and large villages where natural regeneration will be too slow to provide urgently needed wood for local construction and fuel -

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such plantations would also act as shelter belts and provide amenity value.

Forest plantation activities are again required where large scale wood import requirements can be substituted by local cultivation. Not only is construction timber included within this need but also wood for charcoal (particularly for Mogadiscio) where imported fossil fuels would be the only substitute. Here, however, a coordinated programme of bush clearance in the interriverine area will also be established to provide additional grazing land, pilot-scale tsetse fly eradication and, as a by product, wood for both charcoal production and other uses. Export of some forestry products is also foreseen - naturally occurring Boswelia (francincense) species will be supplemented by plantations of the tree. Lastly, some scope remains for tree food crop plantations. Although this is usually the perogative of the Ministry of Agriculture, plantations of food producing trees, particularly on coastal dune areas, have a multipurpose role in food production, animal feed and soil stabilization. In this respect coconut, dates, and possibly cashew nuts are to be grown in conjunction with a ground cover crop for grazing subsequent to tree establishments.

Some research has already been undertaken on suitable tree species for establishment in various topographical and climatological areas in the country. In addition a forest inventory and a wood use survey are planned.

A plantation programme is also necessary on some of the coastal sand dunes where simple exclusion of livestock and cutting activities will not stabilize dunes. This is particularly necessary (and probably only economic) when dunes encroach on valuable agricultural land. The problem is a very serious one, and the N.R.A. is at the present preparing a specific country wide project for sand dunes stabilization. Finance will be sought from bilateral and or international organizations. Meanwhile a limited programme will be undertaken only where urgent work needs to be done.

Financial Implications.

Whilst forestry reserves are relatively inexpensive to establish and maintain, much economic data has still to be collected on the relative merits of natural regeneration versus high investment cost plantation in various areas of the country. Future forestry developments will go hand in hand with evaluation of the two respective methods.

From previous plantation work in the north of the country some information is available on the economics of plantation development both in coastal and escarpment areas. It will be important, however, to compare returns from forestry with those from agriculture when considering land potentially available for both activities. Efforts will be made to limit forestry activities in agricultural areas when both compete for limited land and/or water unless overriding factors are present, e.g. shelter belts around agricultural settlements.

Social and Economic Benefits.

As for range development employment creation is a major consideration. Also the enhancement of the environment is of direct benefit to the local population of the area, both for economic and amenity reasons. Settlements will gain from the greater accesibility of construction materials and fuel wood produced from town plantations. If Tree planting will be undertaken by cooperatives as part of an integrated development incorporating range management and fodder production, or linked with other activities like farming and fishing as in the nomadic resettlement areas. The major forestry plantations (including sand dune stabilization) will remain national (or regional) ventures with benefits accruing to the wider community. As such, finance will be provided (as in the case of research and extension activities and forest and range nurseries) from national funds.

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Expansion of such activities will largely depend on the profits of plantation exploitation although long term State subsidisation of the forestry sector must be expected in the light of the maturation period of many tree species and the continuing need for environmental protection.

4) Local Executing Agency.

The National Range Agency of the Ministry of Livestock, Range and Forestry will assume overall responsibility and coordination for the project. The General Manager of the N.R.A. will be the channel of communications between the Government and WFP in respect of general policy matters, detailed matters regarding operations of reporting and accounting.

5) Cost of the Project. Government and External Support to the Project.

For the development of two major rangeland areas the Government has obtained or is in the process of negotiating loans from Kuwait Fund and the World Bank (IDA). It is also hoping to finance various forestry schemes through bilateral assistance.

Details of costings and finance thus far obtained will be provided to the evaluation commission.

6) WFP Commodities Mode of Calculation of WFP Food.

(a) WFP food is intended to provide a supplementary family ration and will be issued in kind as part payment of wages to workers; the balance will be paid in cash.

(b) For each man day of work performed each worker will receive five rations for himself and four dependents. The annual requirements per year in family rations during the three year duration of the project are indicated in Annex A.

Rations have been calculated at

Why decrease ?

13150	workers x	5	=	for 1979
15060	"	"	=	for 1980
14760	"	"	=	for 1981

When two or more members of a family are engaged in the project activities only one family ration will be distributed, the other worker (s) of the family will get full wages.

(c) The WFP daily ration for individuals will consist of :

Commodity	Grammes
W/flour	450
Vegetable oil	40
DSM	40
Tea	3

Will it possible to divert flour without flow ENC.

The N.R.A. will exchange through the National Agency for Trade (ENC) - a Government Monopoly - the wheat flour supplied against equal quantities of sorghum or maize. In the case that the price of wheat flour is higher than that of locally provided sorghum or maize, the cost surplus will be used to purchase sugar or dates.

(d) Local food to be consumed in addition to WFP food.

Families are expected to provide themselves with local food such as fruits and other animal protein food in order to have a nutritionally adequate diet.

7) Mode of distribution of WFP Food.

Will it possible to sell food at the ports.

WFP commodities will be delivered at the ports of entry Mogadiscio, Berbera, Kisimayo, where the Food Aid Unit of the Ministry of Local Government and Rural Development will be responsible for clearing, storing and distributing the food up to Regional level. Adequate storage facilities exist in the three ports and at Regional capitals. The N.R.A. will transport the WFP food from the F.A.U. Regional stores to the districts and to the work sites.

Food will be distributed to the workers and their families on a monthly basis.

8) Provision of Meeting Non - food costs.

ask. Addition of 13150. added on the budget.

The non-food cost of the project will be defrayed by the National Range Agency. The necessary funds will be included in each year's budget. In addition the Non-food Item Unit of WFP will be requested by the N.R.A. to approach potential Non-governmental Organizations as well as bilateral donors to possibly obtain funds necessary to purchase any tools and materials needed by the range and forestry workers, and which are not covered through existing donor grants and loans.

9) Condition for avoiding displacement of Commercial Supplies.

The food supplied by WFP will be distributed as part payment of wages to volunteer workers who will be undertaking the majority of the activities envisaged under the project. These workers have low incomes and their food intake is usually inadequate. WFP food supplies are therefore expected to lead mostly to additional consumption, particularly in a country not yet self sufficient in food production. In view of this and the relative quantities involved only a minor adverse effect on commercial supplies and no adverse effect on local production are anticipated.

10) Arrangement for carrying on the Purpose of the Project after Termination of WFP Aid.

The N.R.A., upon termination of the WFP input, will continue implementing the activities of the project and progressively expand the coverage until reaching all range and forestry areas in the country. This is in line with the central government's general policy. The Government intention is not only to continue but to increase its range and forestry programme and will make every effort to finance it from its own resources, at the end of the WFP project. Revenues from fodder production, grazing fees and taxes on livestock exports will be available to offset wage costs of workers in range development. However, due to severe financial constraints facing the country and since direct economic benefits from forestry activities cannot be realised in the short term, food aid may still play a supporting role in future.

Technical considerations and methodology.

Rangelands

In selected sites where reserves have been set up and their yields compared with those of open rangeland at least a four fold increase in grass and forage has been obtained in a two year period.

Rotational reserves of 300km^2 divided into four areas, one of which will be closed on a two year rotating basis, will be set up around permanent water points. On a full 8 year rotation these would be expected to yield 25% additional grazing capacity and also to induce reestablishment of grass species in rested areas. Attempts will be made to divide such reserves into areas of equal carrying capacity where possible. Thecycle of rotation will be varied according to experience, local requirements and capacity to manage a more flexible system of deferred grazing. It is not thought, however, that a more flexible system will be able to be introduced during the life of the project. Ten guards will be sufficient to operate each reserve and will additionally be responsible for demarcation of area boundaries, upgrading the environs of the central watering point, and minor conservation works including some experimental bush clearing. Large scale bush clearing also involving bush clearing will be undertaken on some sites on contract basis.

Town reserves will follow the above pattern but will be sited around towns and large villages where requirements for local livestock are high (particularly for dairy cattle). Fifteen workers will be required per site since demarcation and guarding activities around large settlements are more complex, involving separation of livestock from housing and minor agricultural areas adjacent to watering facilities.

Famine reserves sited one, two or three per District will be 600 km^2 in size, closed permanently, and guarded by 20 guards. However only external demarcation will be required until the reserve is converted into two rotational grazing reserves at some time in the future. This will be undertaken when sufficient rotational reserves are established in the area to afford an adequate supply of emergency grazing for drought periods.

Fodder farms

Tug diversion

These will comprise a diversion wall in the tug channel leading, through a canal, to a 500 ha bunded area where flood waters will be spread The areas will be planted to various fodder crops which will be harvested by stock owners themselves on payment of an agreed fee or cut where possible by machine, baled, stored and sold. Selection of six sites will be made in the Northern Rangelands area with due consideration to technical feasibility and strategic placing. Sites will be surveyed, mapped and finally pegged, an operation taking 6 months and requiring a survey team plus 10 workers.

This will be followed by construction, mainly using hand labour on which an average of 250 workers will be employed on each for 30 months.

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Finally a period of consolidation, strengthening and maintainence of field bunds is necessary involving 150 workers for the following year, 100 for the next and 50 workers finally as a permament maintainence crew. Construction works include development of water points and camp site and road construction. Watering facilities will also take into account nomadic stock requirement during feeding.

Bunding

Suitable sites in the Northern Rangelands area and in other parts of the country will be chosen in relation to appropriate topography and strategic siting. Although construction details will vary from site to site an average of 400 metres of half a metre high bunds will be constructed per hectare with sites averaging 1000 ha each. Following 3 months surveying, mapping and pegging also involving a surveying team and 10 workers construction will commence using an average of 150 workers per site for 15 months. Up keep and maintainance of bunds will require the continuing use of 50 workers for the next 2 years, 30 for the 3rd year and 20 for subsequent years. Again construction includes water and camp site facilities.

River irrigation

A few sites on the Shebelli and Juba rivers will be chosen where land is available on these natural grazing and marketing routes. Both rivers will require pump irrigation for part of the year, although some areas of the Shebelli are capable of using seasonal flood waters. Main canals and land levelling will be undertaken by machine although minor channels and the finishing of main canals will be done by hand. Cutting of most fodder crops will also be by hand labour, taking advantage of the higher population densities of the river valley areas. Following survey mapping and pegging (3 months) construction will require an average workforce of 50 people who would remain since they will be required for forrage cutting and irrigation system maintainance. Watering places next to the river (hilos) will serve both human and animal needs.

Research and Demonstration Sites and Exclosures

Range management research and demonstration will be undertaken in all ecologically district areas of the country. Small scale demonstration plots and exclosures(a few hectares) will act as both research and extension tools in determining and demonstrating the regeneration of range protected from grazing or under strict management and grazing conditions. Workers will be required at each site to act as guards, erect fencing and at some sites undertake demonstration soil and water conservation works:-
3 per exclosure, 10 per research site and 20 per demonstration site.

Cooperatives

Cooperatives will be encouraged to carry out improved range management through deferred rotation of grazing areas and also small scale fodder production and soil and water conservation. Areas allocated to cooperatives will usually be much smaller than rotational reserves run by the NRA although livestock carrying capacities are likely to be more similar. Workers to be employed in the above tasks will vary according to the size of the cooperative but will probably average 25. Technical Supervision and training of ccoperative members will be undertaken by the regional and district staff of the NRA.

Nurseries

Range and forestry nurseries will be combined, providing a service to both subsectors. 10 workers are sufficient to run small nurseries but those supplying trees for large scale plantations will require 25-50 workers.

Forestry

Reserves

15 reserves will be established varying in size from 120 km^2 to 2000 km^2. These will be demarcated exclosures with use of forest products and underlying grazing and browse either completely banned or restricted to closely managed usage. 10 guards will be sufficient for the smallest reserves with 40 required for the largest.

Plantations

Plantations sites will be developed most involving integrated nurseries. Depending on size 20 to 200 workers will be needed per site. In coastal areas and flat plains or river valleys work will primarily involve seedling production, planting (including hole digging), watering, weeding and guarding. On sloping sites activities will also include bunding to reduce runoff. Town shelter belts/woodlots are also included as plantation sites although adjacent areas will also be reserved as exclosures. In this way a comparison of plantation versus natural regeneration can be observed.

Sand Dune Fixation

Some additional fixation works will be conducted on moving dunes close to agricultural areas and main towns near the Indian Ocean coast. The work will entail the erection of brushwood windbreaks, the plantation of selected tree species of economic importance (wood, forage and food crops) and the stabilisation of the acute face of moving dunes with cactus and other low growing species.

Forestry research sites

Sites will be used for experimental planting progress to further determine species suitability, for investigations of natural regeneration under varying but controlled conditions and to act as arboreta in which will be grown examples of the trees and shrubs to be found in Somalia, both for research and educational purposes. 20 workers undertaking nursery and guarding work will be employed at each site with the exception of the main Mogadishu site which will be larger, including the National Arboretum, and will require 50 workers.

Nurseries

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Nurseries

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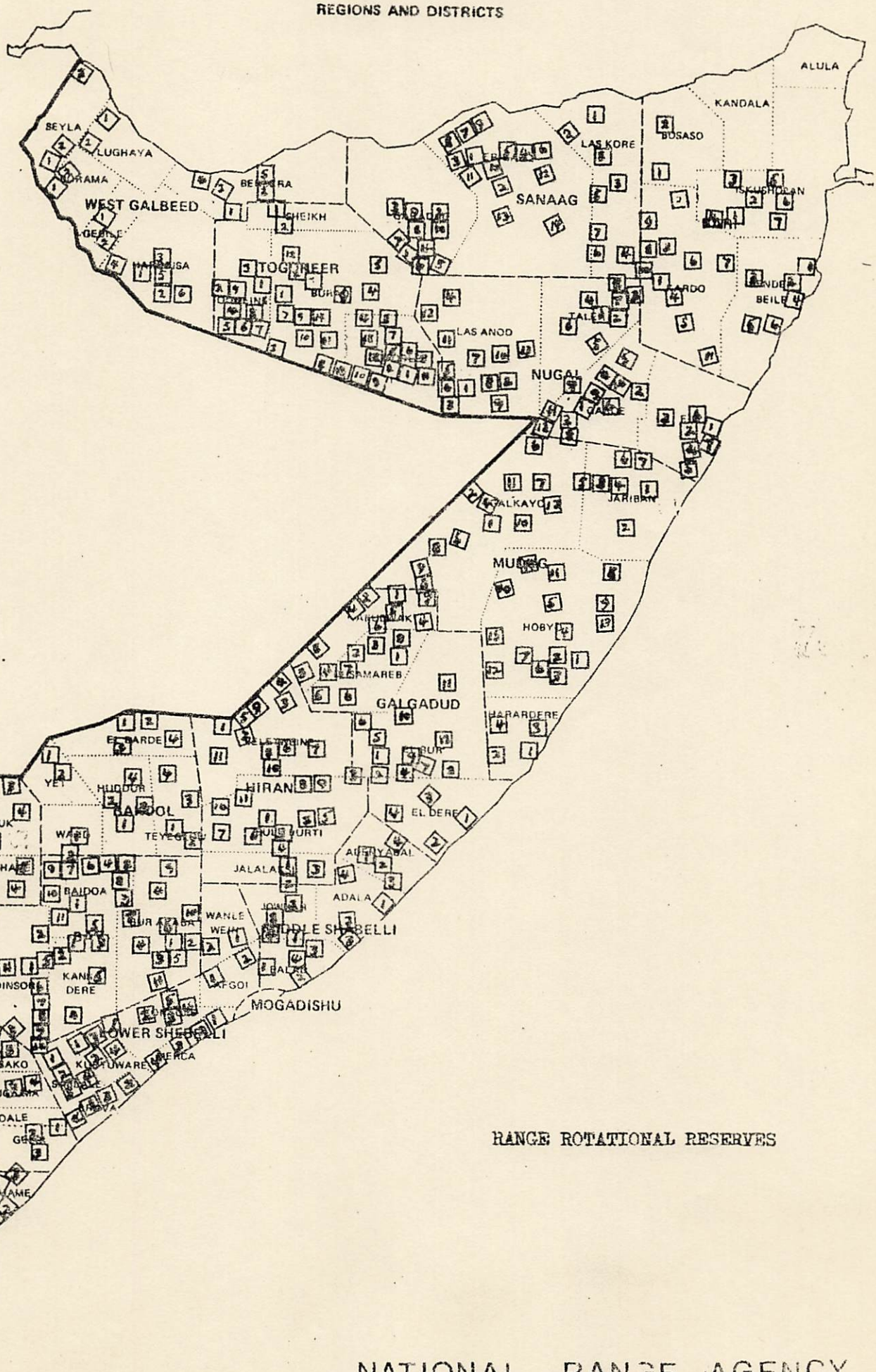
Charcoal development/Bush clearing

As mentioned previously this will be a combined activity with expanded range management in the interrivemine area. Tsetse eradication on a pilot scale linked with strip clearing will be starting in 1979. Such a combined operation will also have to be introduced at experimental level at first, particularly where the economies of producing charcoal from all types of mixed woodland species is not known and experimentation is still required to determine the most economic mix of grasses and browse plants for maximum productivity of different livestock types grazing together. Consequently little has been included at this stage in range and forestry development plans in relation to this activity other than on an experimental basis. Work will be included within research activities and range management of a few rotational reserves in the Shebelli area.

Map No. 1

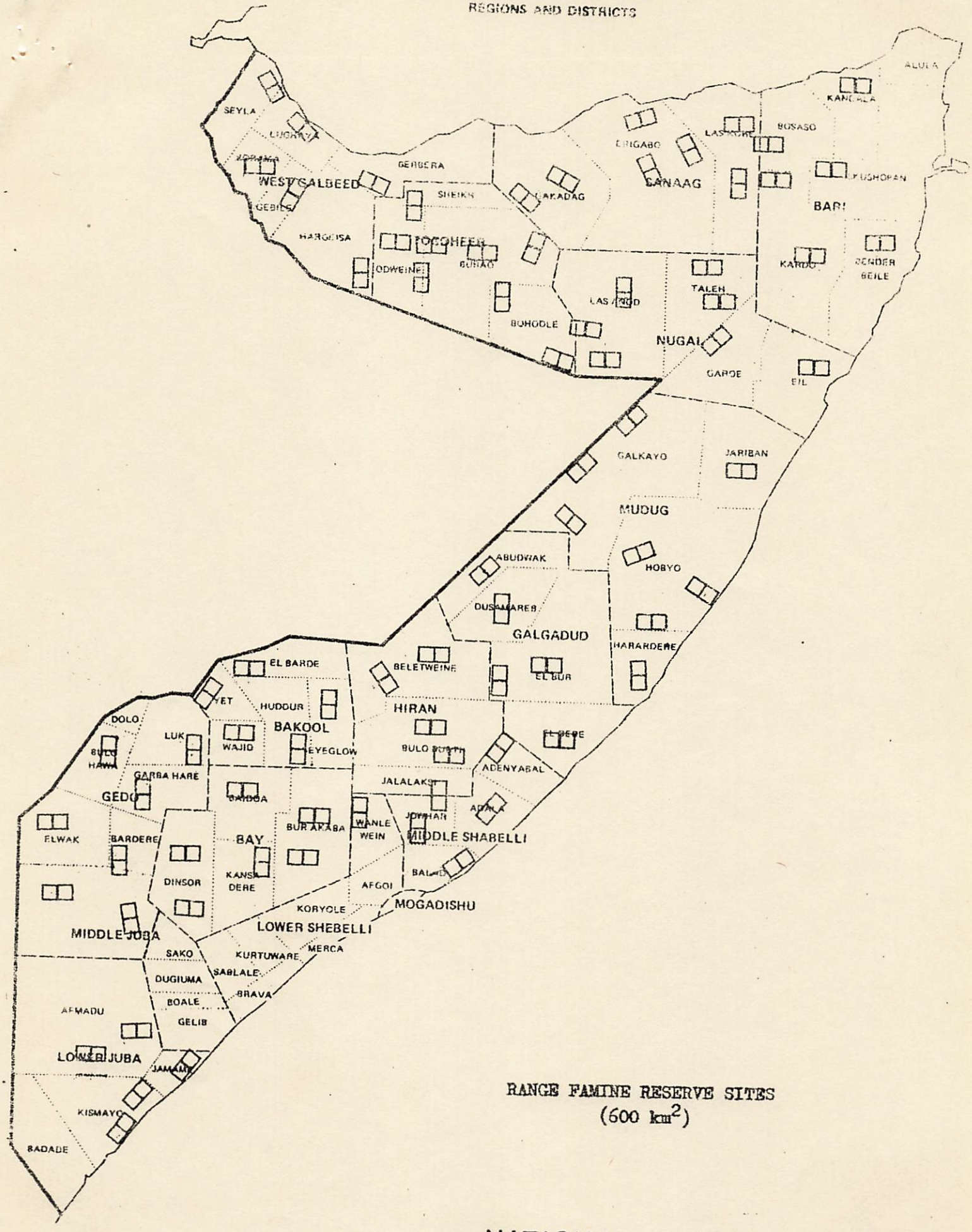
SOMALI DEMOCRATIC REPUBLIC
REGIONS AND DISTRICTS



RANGE ROTATIONAL RESERVES

NATIONAL RANGE AGENCY

SOMALI DEMOCRATIC REPUBLIC
REGIONS AND DISTRICTS

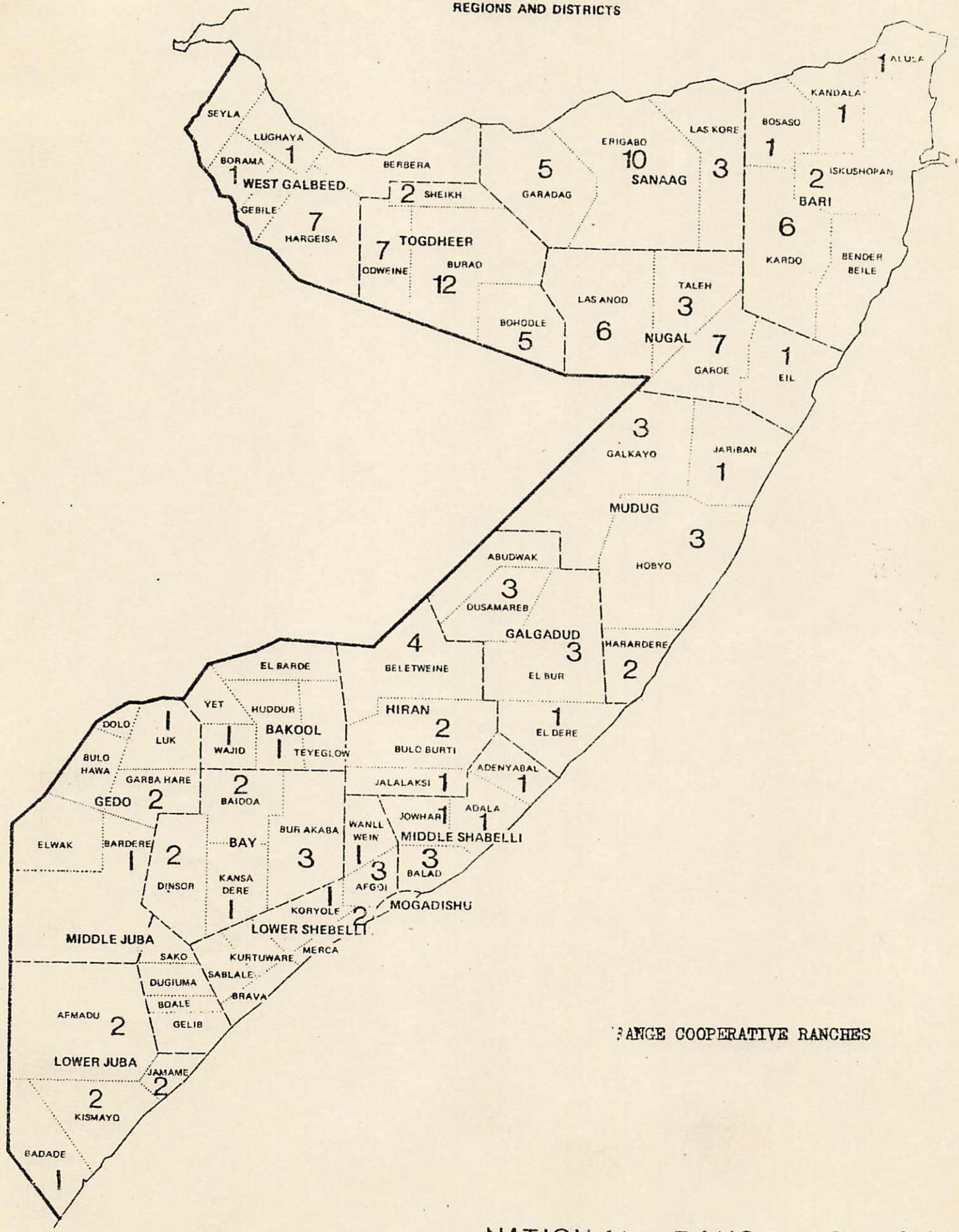


RANGE FAMINE RESERVE SITES
(600 km^2)

NATIONAL RANGE AGENCY

Map No. 4

SOMALI DEMOCRATIC REPUBLIC
REGIONS AND DISTRICTS

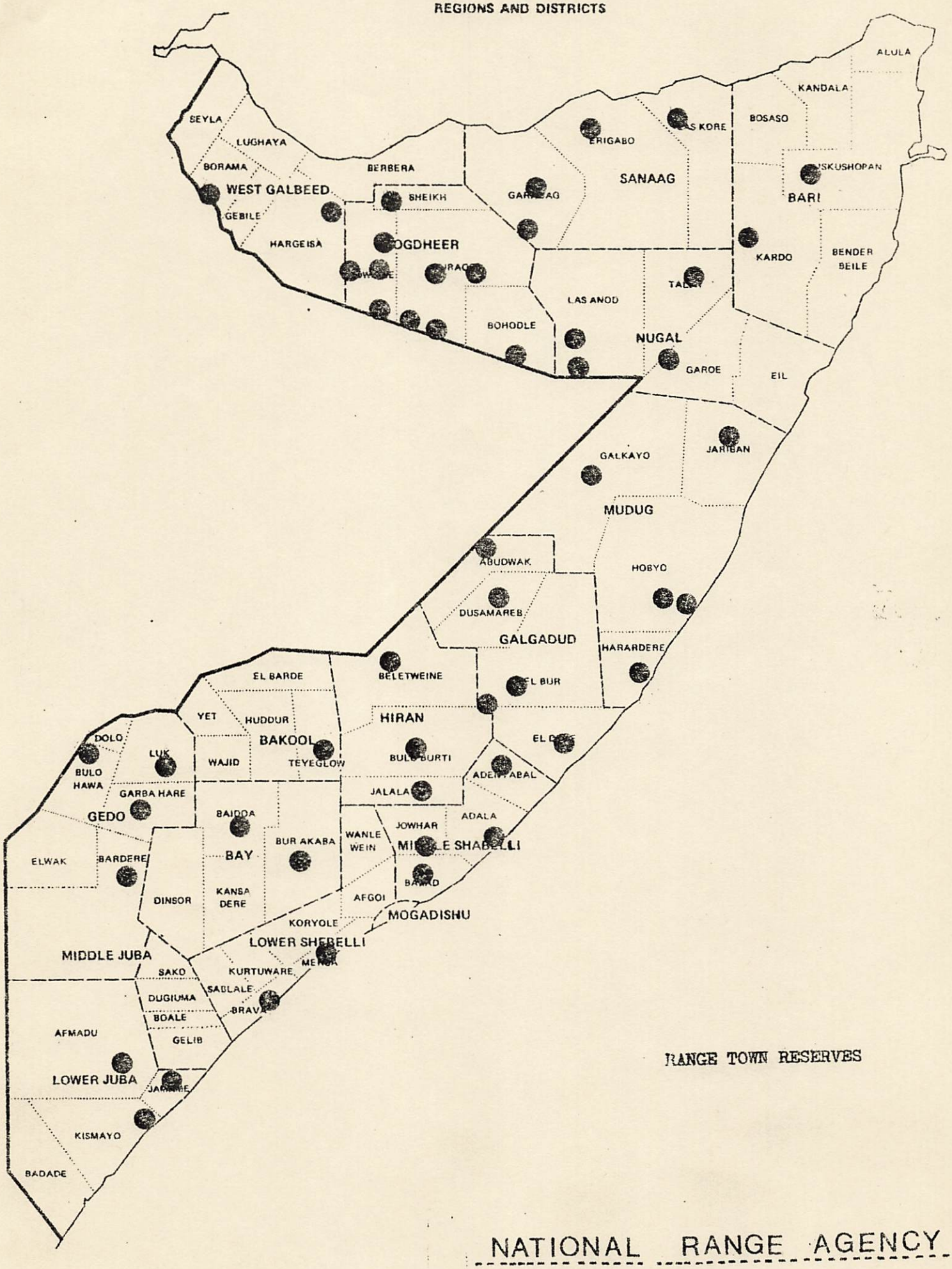


RANGE COOPERATIVE RANCHES

NATIONAL RANGE AGENCY

Map No. 3

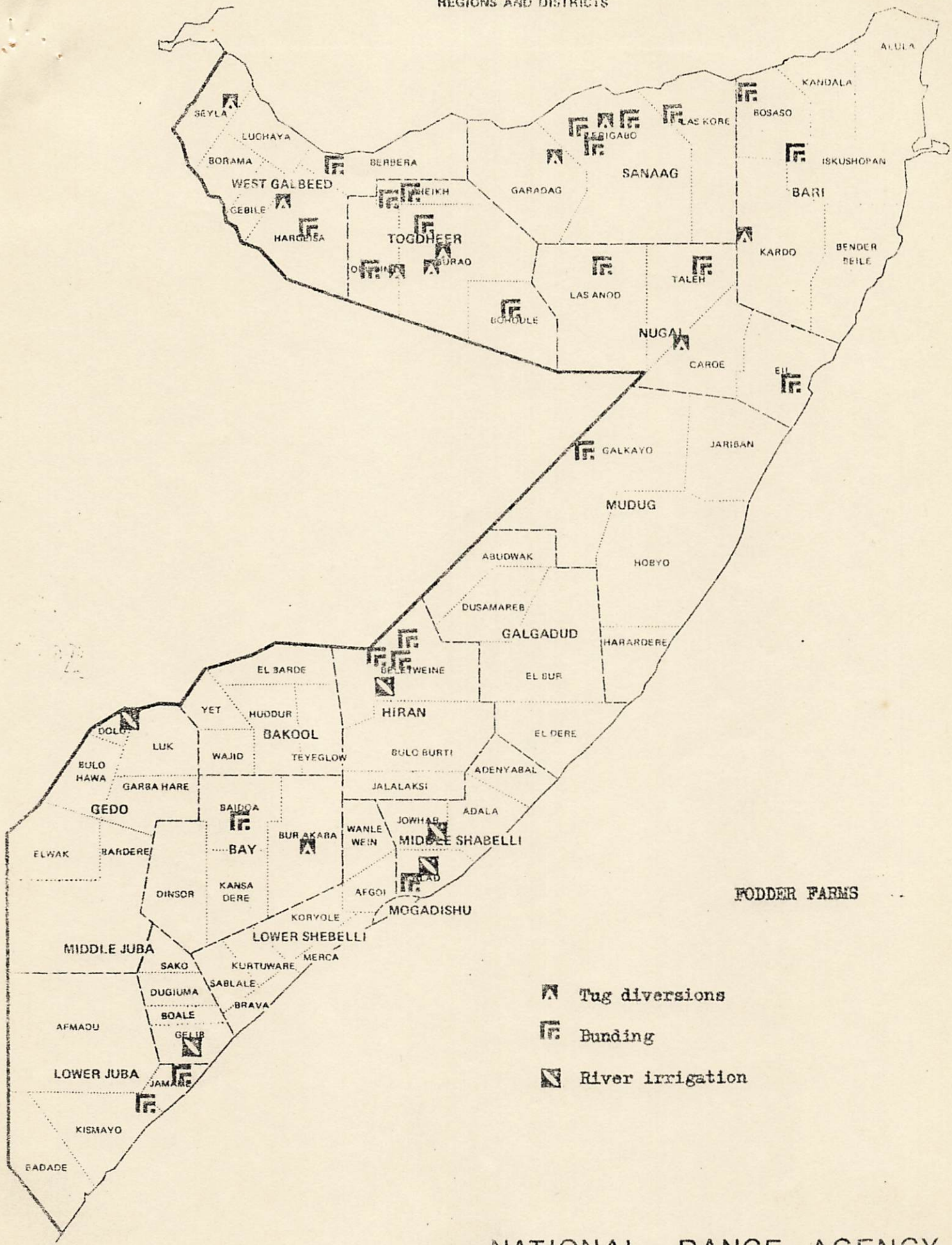
SOMALI DEMOCRATIC REPUBLIC
REGIONS AND DISTRICTS



RANGE TOWN RESERVES

NATIONAL RANGE AGENCY

SOMALI DEMOCRATIC REPUBLIC
REGIONS AND DISTRICTS



FODDER FARMS

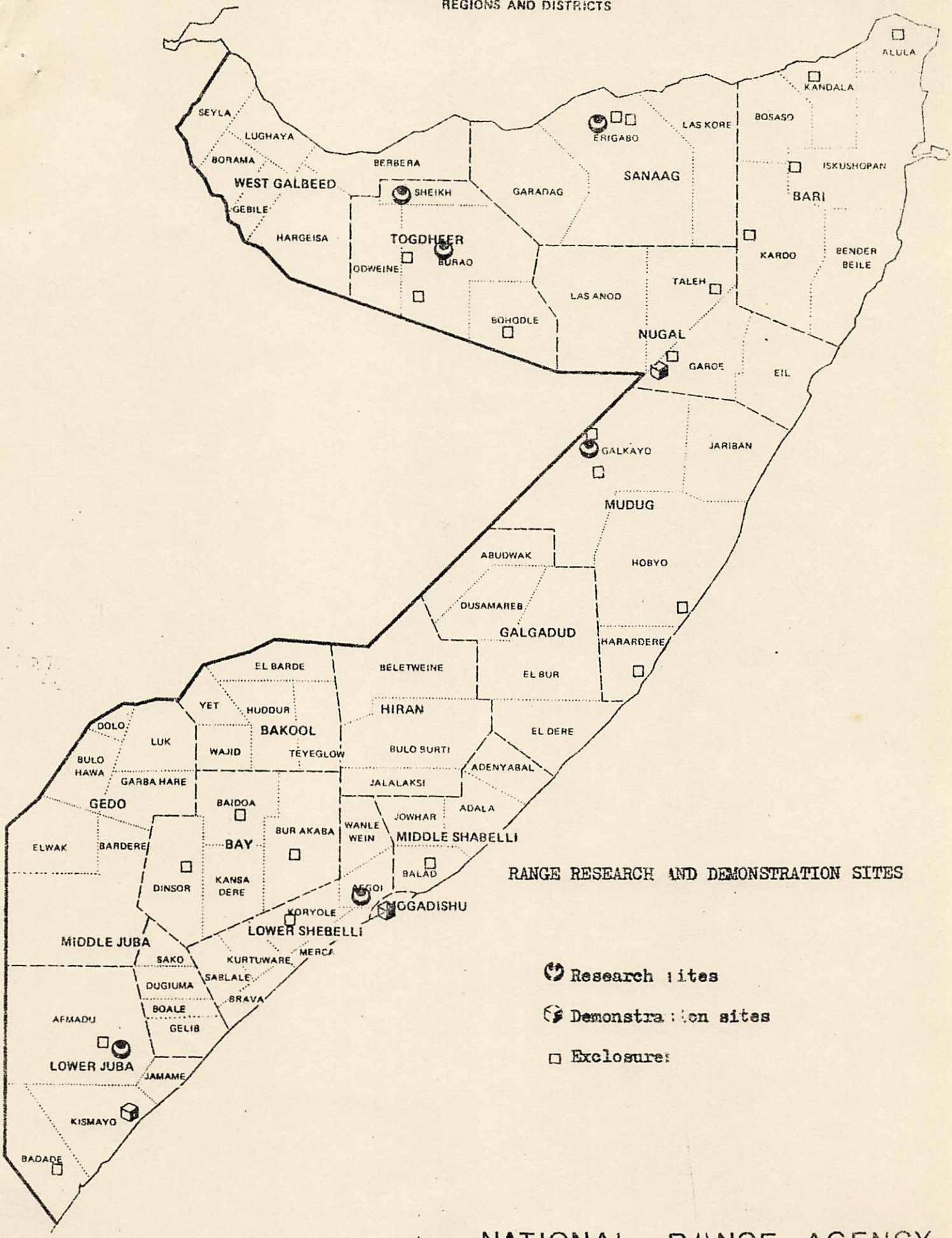
Tug diversions

Bunding

River irrigation

NATIONAL RANGE AGENCY

SOMALI DEMOCRATIC REPUBLIC
REGIONS AND DISTRICTS



RANGE RESEARCH AND DEMONSTRATION SITES

Research sites

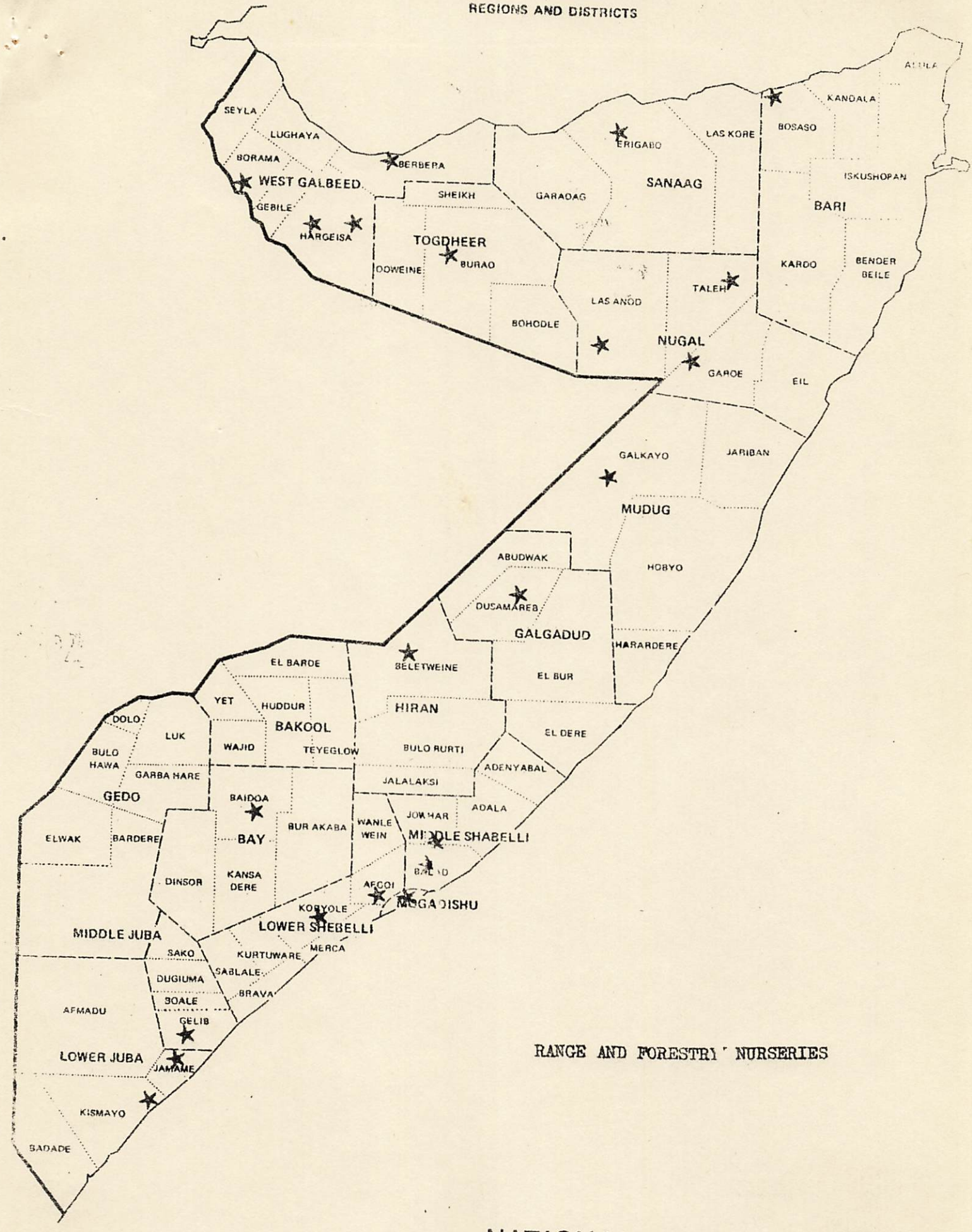
Demonstration sites

Exclosures

NATIONAL RANGE AGENCY

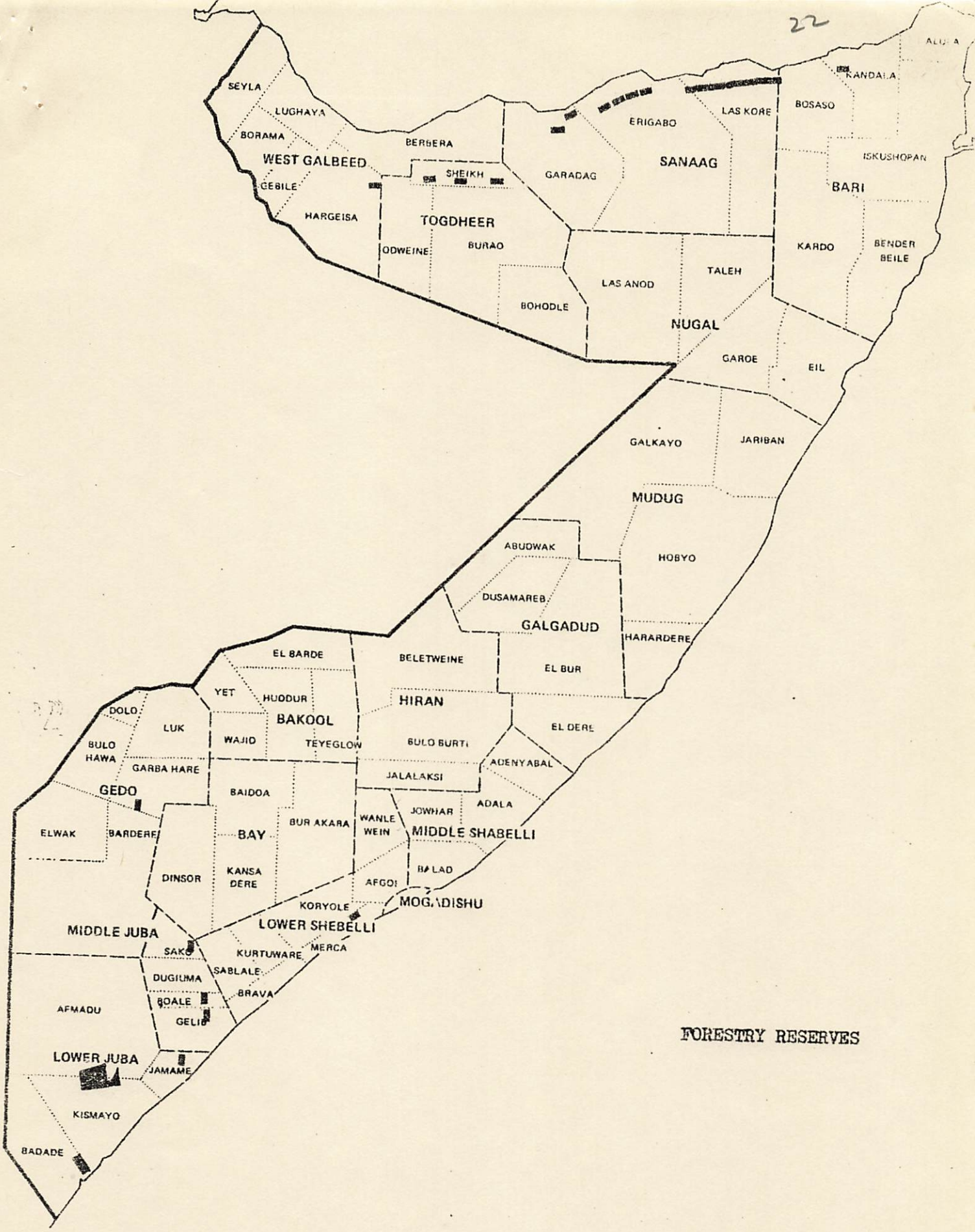
Map No. 7

SOMALI DEMOCRATIC REPUBLIC
REGIONS AND DISTRICTS



RANGE AND FORESTRY NURSERIES

NATIONAL RANGE AGENCY



FORESTRY RESERVES

NATIONAL RANGE AGENCY

REGIONS AND DISTRICTS

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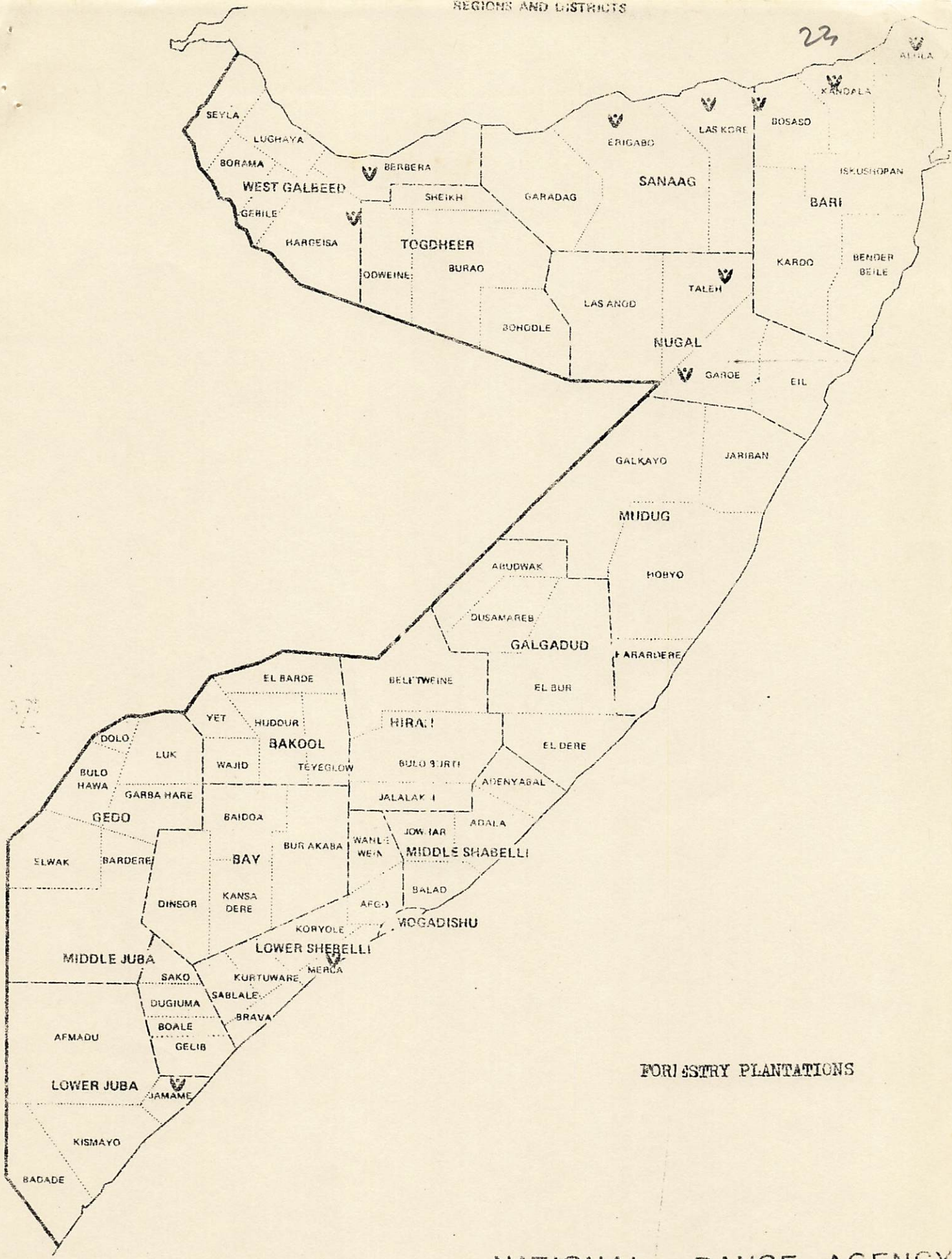

FORESTRY PLANTATIONS

NATIONAL RANGE AGENCY

Map No. 12

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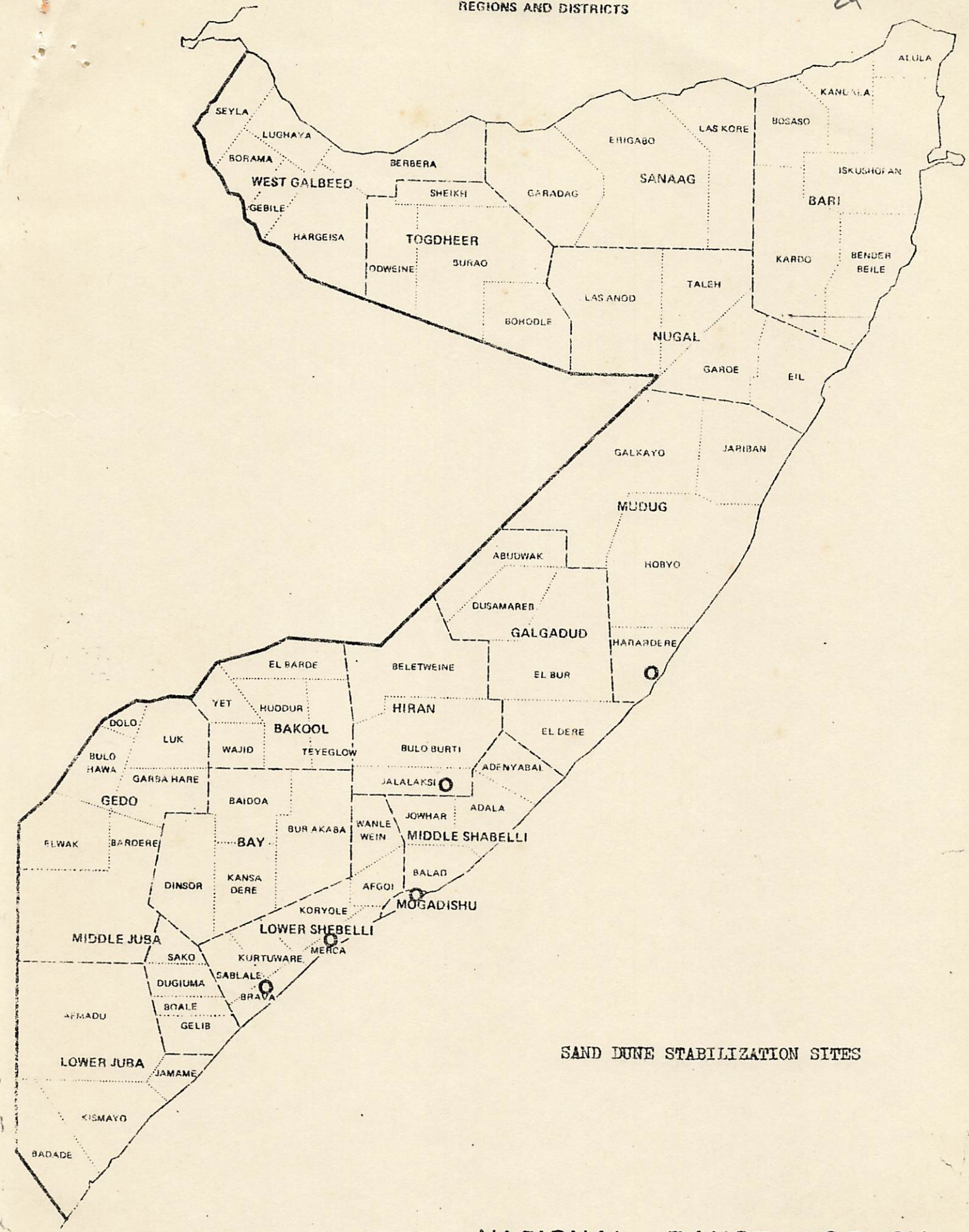
SOMALI DEMOCRATIC REPUBLIC
REGIONS AND DISTRICTS



SAND DUNE STABILIZATION SITES

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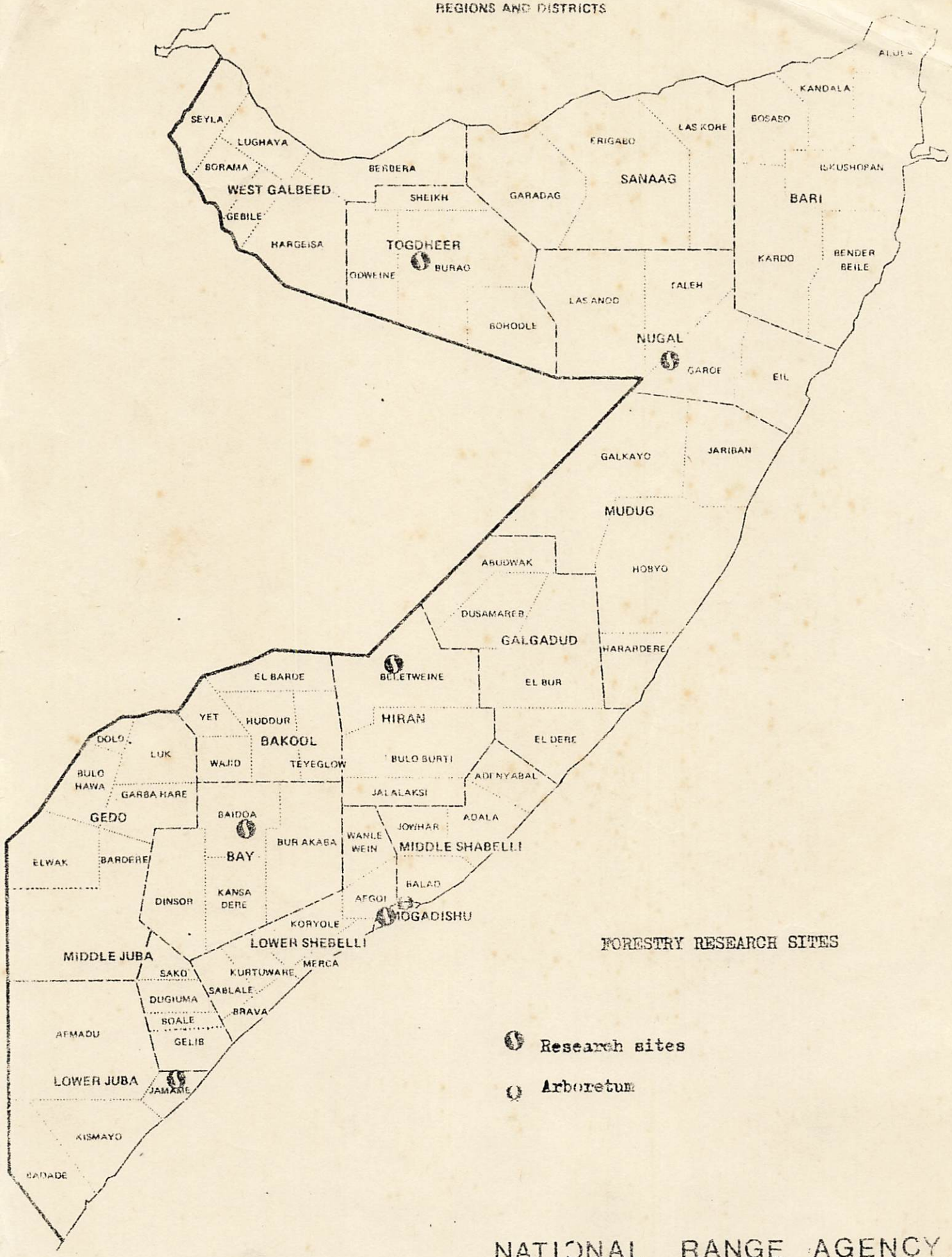
Map No. 10

SOMALI DEMOCRATIC REPUBLIC
REGIONS AND DISTRICTS



FORESTRY RESEARCH SITES

● Research sites

○ Arboretum

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