

including support costs. These average cost estimates are very general; hourly rates vary substantially among livestock operations depending on the complexity of the site-specific practices that are needed.

Averaging the two estimates, an hourly rate of \$55 was selected to approximate the dollar value of technical assistance hours. Applying the \$55 hourly rate to the 38.2 million hours results in an estimate of about \$2.1 billion, or about \$8,126 per farm for the 257,201 CNMP farms.

## Summary of CNMP development and implementation costs

The annual CNMP implementation cost for all four CNMP elements averaged \$6,748 per farm for the 257,201 farms that are expected to need a CNMP, and CNMP development costs, in terms of technical assistance hours, averaged 149 hours per farm (table 38). In addition, off-farm land application costs, which are assumed to be borne by the manure-receiving farms in this assessment, averaged \$98 per CNMP farm. The

**Table 38** CNMP costs per farm, by livestock type and farm size

Dominant livestock type or farm size	Number of farms	Animal units per farm*	Record-keeping costs per farm (\$/yr)	Nutrient management costs per farm (\$/yr)	Off-farm transport costs per farm (\$/yr)	Land treatment costs per farm (\$/yr)	Manure & wastewater handling & storage costs per farm (\$/yr)	Total CNMP implementation costs per farm				CNMP development costs (hr/farm)
								Average (\$/yr)	Low** (\$/yr)	High** (\$/yr)	Per animal unit (\$/yr)	
Fattened cattle	10,159	1,298	142	1,655	4,646	2,613	9,112	18,167	1,026	308,005	14	147
Milk cows	79,318	195	160	2,101	1,619	2,660	3,249	9,788	2,362	97,013	50	192
Swine	32,955	276	224	1,601	2,450	3,615	4,139	12,029	2,060	75,159	44	201
Turkeys	3,213	687	90	230	6,169	3,391	7,940	17,820	1,643	122,412	26	126
Broilers	16,251	183	90	248	1,667	1,220	2,351	5,576	1,128	36,187	30	95
Layers/pullets	5,326	297	136	144	7,414	1,685	4,015	13,394	342	95,887	45	100
Confined heifers/veal	4,011	301	117	1,153	1,410	2,026	3,192	7,898	594	76,660	26	195
Small farms with confined livestock types	42,565	25	54	203	16	351	199	823	102	4,953	33	163
Pastured livestock types	61,272	117	54	211	3	357	823	1,448	280	7,757	12	73
Specialty livestock types	2,131	17	54	180	0	634	843	1,691	1,711	3,256	NA	101
Large farms	19,746	1,419	168	1,526	9,679	3,925	15,167	30,465	2,199	252,014	21	170
Medium farms	39,437	252	150	1,085	2,281	2,897	3,397	9,809	1,210	64,426	39	151
Small farms	198,018	80	106	987	345	1,267	1,070	3,773	161	25,298	47	146
<b>All types</b>	<b>257,201</b>	<b>210</b>	<b>117</b>	<b>1,043</b>	<b>1,358</b>	<b>1,721</b>	<b>2,509</b>	<b>6,748</b>	<b>195</b>	<b>67,429</b>	<b>32</b>	<b>149</b>

\* Represents **all** animal units on the farm, but does not include animal units for specialty livestock types, which were not estimated.

\*\* The **low** estimate corresponds to the one-percentile value for the farms in each group, and the **high** estimate corresponds to the 99th-percentile value.

manure and wastewater handling and storage element represented the largest portion of implementation costs at 37 percent, followed by 26 percent for land treatment, 20 percent for off-farm transport, 15 percent for nutrient management, and 2 percent for recordkeeping.

Determination of which farm group had the highest average cost depends on whether the cost is based on a per-farm average or a per-animal-unit average. The average annual implementation cost per farm was highest for fattened cattle farms and turkey farms (\$18,167 and \$17,820 per farm, respectively). However, these two groups of farms also had the most animal units per farm, on average (table 38). On a per animal unit basis, dairies had the highest cost at \$50 per animal unit, followed by layer and pullet farms at \$45 per animal unit and swine farms at \$44 per animal unit. Turkey farms had a moderate cost per animal unit of \$26, and fattened cattle farms averaged only \$14 per animal unit, the lowest of all the farm groups except farms with pastured livestock types. The lowest annual average cost per farm was for small farms with confined livestock (\$823 per farm), which also had the fewest animal units per farm. CNMP costs for small farms with confined livestock averaged \$30 per animal unit. The average cost per animal unit for all farms was \$32.

CNMP implementation costs varied greatly among farms. This variation is shown in table 38 by the differences between the low and high cost estimates for each of the farm groups. The low estimate corresponds to the one-percentile value for the specified farm group, and the high estimate corresponds to the 99th percentile estimate. Costs were generally highest for the largest farms, averaging \$30,465 per farm annually for farms that produced more than 10 tons of manure phosphorus annually. The average annual cost was \$9,809 per farm for medium-size farms, which produced 4 to 10 tons of manure phosphorus annually, and \$3,773 per farm for small farms, which produced less than 4 tons of manure phosphorus annually. However, among the large farms the annual per-farm cost ranged from a low of about \$2,199 per farm to a high of about \$252,014 per farm. This wide range in costs per farm among the largest farms reflects differences in livestock types and manure management and handling systems, but also reflects differences in CNMP needs. For example, farms with enough onfarm land to meet CNMP application criteria would not

incur any off-farm export costs, whereas farms with few onfarm acres available for land application could incur large off-farm transport costs. Farms in counties that do not have enough acres to apply all of the manure according to CNMP application criteria have an additional off-farm transport cost associated with transporting the excess manure to a central processing facility.

CNMP implementation costs per farm also varied regionally (table 39). The Pacific region had the highest annual average cost at \$19,464 per farm, reflecting a predominance of large farms in that region and relatively high costs associated with off-farm transport. The lowest implementation cost per farm was for CNMP farms in the Lake States region and the Delta States region, averaging \$4,469 per farm and \$4,832 per farm, respectively.

The cost of developing a CNMP also varied by livestock type, farm size, region, and manure management and handling systems, but not as dramatically as implementation costs. There is a practical minimum cost for developing a CNMP because, regardless of how small the farm is, a basic set of tasks needs to be performed. Larger farms generally have more complex situations and more acres that need to have nutrient management plans, but the technical assistance required is not proportional to the size of the operation. The highest average CNMP development cost was for swine farms at 201 hours per farm, followed by confined heifer and veal farms at 195 hours per farm and dairies at 192 hours per farm. The lowest per-farm estimates of CNMP development costs were for broiler farms (95 hours per farm), farms with pastured livestock types (73 hours per farm), and specialty livestock farms (101 hours per farm). CNMP development costs were highest on a per-farm basis in the Pacific, Northeast, and Lake States regions, and lowest in the Delta States, Southeast, and Appalachia regions.

Over half of the total CNMP implementation costs and two-thirds of the CNMP development costs were accounted for in three regions—the Corn Belt, Lake States, and Northeast. These three regions also had the largest number of CNMP farms, representing 61 percent of the 257,201 CNMP farms. The Delta States, Mountain, Southeast, and Southern Plains regions had the lowest proportion of total costs, collectively representing only 18 percent of CNMP implementation costs and 14 percent of CNMP development costs.

**Costs Associated with Development and Implementation of Comprehensive Nutrient Management Plans**  
Part I—Nutrient Management, Land Treatment, Manure and Wastewater Handling and Storage, and Recordkeeping

CNMP implementation costs for the 257,201 CNMP farms totaled \$1.736 billion per year. Over the 10-year implementation period, the total cost would be \$17.36 billion. This extrapolation is appropriate for capital costs because a 10-year recovery period was used in the calculations. For annual operating costs, however, the extrapolation is based on an additional assumption that annual operating costs would be defined as CNMP costs for 10 years following CNMP implementation, after which the operating costs would become absorbed into the production costs as one of the costs of doing business.

CNMP development costs totaled 38.2 million technical assistance hours spread over the 10-year implementation period. Assuming an average hourly cost of \$55 for the technical assistance hours, the total cost for CNMP development for the 257,201 CNMP farms would be about \$2.1 billion over 10 years.

Overall, CNMP development and implementation costs are expected to be about \$19.5 billion. About 10 percent is for CNMP development (\$2.1 billion), and about 90 percent is for CNMP implementation (\$17.4 billion). The average cost per farm would be about \$76,000 spread out over 10 years, or \$7,600 per farm per year for 10 years.

**Table 39** Annual CNMP costs per farm, by farm production region

Farm production region	Number of farms	Record-keeping costs per farm	Nutrient management costs per farm	Off-farm transport costs per farm	Land treatment costs per farm	Manure & wastewater handling & storage costs per farm	Total CNMP implementation costs per farm			CNMP development costs
							Average	Low*	High*	
		(\$/yr)	(\$/yr)	(\$/yr)	(\$/yr)	(\$/yr)	(\$/yr)	(\$/yr)	(\$/yr)	(hr/farm)
Appalachian	22,899	110	606	2,722	2,154	2,987	8,579	211	72,434	117
Corn Belt	71,540	120	973	380	2,312	1,647	5,432	163	43,143	152
Delta States	12,352	97	387	1,865	302	2,181	4,832	298	45,575	99
Lake States	52,817	123	1,430	257	990	1,669	4,469	254	29,559	170
Mountain	7,964	119	713	2,272	77	6,177	9,358	172	122,031	158
Northeast	31,598	124	1,712	1,030	4,465	1,976	9,307	296	65,715	179
Northern Plains	26,309	105	1,000	977	395	3,088	5,566	266	79,763	125
Pacific	7,974	157	812	10,697	67	7,731	19,464	134	161,378	189
Southeast	12,807	101	419	2,952	1,223	2,901	7,596	182	65,524	104
Southern Plains	10,941	106	597	2,163	334	4,776	7,976	125	143,563	137
All regions	257,201	117	1,043	1,358	1,721	2,509	6,748	195	67,429	149

\* The **low** estimate corresponds to the one-percentile value for the farms in each group, and the **high** estimate corresponds to the 99th-percentile value.